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SCIENCE, TECHNOLOGY, AND AMERICAN DIPLOMACY

1991

Twelfth Annual Report Submitted to the Congress by the President Pursuant to Section 503(b) of Title V of Public Law 95-426

JULY 1991

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FOREWORD

As the cold war ends, the new international order has been characterized by regional stresses and realignments. The economic and technological challenges manifested by such global issues as energy shortages in the industrialized North, water shortages in the Middle East, industrially related environmental pollution in Central Europe, and foreign debt in Latin America, often underlie political conflicts. International cooperative efforts in science and technology afford uniquely effective mechanisms in developing solutions to many of these underlying causes of tension and in reformulating U.S. foreign relations.

In the United States, we have long recognized that scientific and technological progress are the foundation of our own economic growth and we have seen that, in many instances, international scientific cooperation can have many benefits. Cooperative international efforts in health, agricultural productivity, and environmental pollution produce benefits for all associated nations.

Indeed, our own economy has become increasingly dependent on global markets and industrial competitiveness can no longer be measured on a national scale. These considerations will become more important as European integration moves forward. For example, the European Community is undertaking a long-term effort to set common technical standards which will not only be enforced within the Community but will compete with American technical standards internationally. Clearly, we ignore international cooperation in setting technical standards at our own peril.

The Congress and the Administration have both recognized the growing importance of international cooperation in science and technology to the conduct of foreign policy. As these activities increase, Science, Technology, and American Diplomacy has become a particularly useful basic reference tool and foundation for policy analysis and formulation.

This report has been submitted to our Committees by the President pursuant to Section 503(b) of Title V of Public Law 95–426, the Foreign Relations Authorization Act for Fiscal Year 1979. Title V requires that the President transmit annual recommendations to the Congress on: (1) personnel needs, standards, and training to fulfill the intent of the law; (2) the continuation of existing bilateral and multilateral activities and agreements primarily involving science and technology activities, with an analysis of their foreign policy implications and technological benefits for the parties involved, the adequacy of funding for these activities, and plans for routine evaluation of the activities; and (3) equity of access to public research and development opportunities with major United States trading partners.

This year's format, discussing major global issues in international scientific and technological cooperation, together with the country narratives and appendices, is a significant improvement over previous reports and does provide a useful basic reference to review major international science and technology developments. The thematic approach which serves as a framework for this year's report adds a sense of coherence that was lacking in previous reports. Also, the bibliographic and index sections provide useful reference tools.

We are disappointed, however, that this year's report was submitted more than six months late, a delay which severely limits the usefulness and timeliness of the information. The Committees would like future appendices of science and technology agreements to contain information on the level of activity that occurs under an agreement, an evaluation of its usefulness in achieving U.S. foreign policy goals, and the amount of U.S. funds needed to support the agreement. Indeed, we are concerned that, in a number of cases, it is impossible to determine if an agreement is still in force. While the thematic issues approach has resulted in a more coherent report, we are concerned that some significant international issues have been ignored. Issues connected with agriculture, minerals and natural resources, and natural hazard mitigation have been neglected. Additionally, since regional issues are becoming increasingly important to policy formulation, we hope that future reports will contain regional analyses and foreign policy goals and objectives. Strategically important regions such as Africa and the Middle East deserve more attention.

The views expressed in this report, unless otherwise noted, are those of the Administration and do not necessarily reflect the views of the Committee on Foreign Affairs or the Committee on Science, Space, and Technology of the House of Representatives. The Committees commend the many Executive Branch personnel who contributed their time, analyses, and observations to this Title V report.

George E. Brown, Jr.,
Chairman, Committee on Science, Space, and Technology.

Dante B. Fascell,
Chairman, Committee on Foreign Affairs.

LETTER OF TRANSMITTAL

THE WHITE HOUSE
WASHINGTON

June 21, 1991

Dear Mr. Speaker:

In accordance with Title V of the Foreign Relations Act of Fiscal 1979, as amended (Public Law 95-426; 22 U.S.C. 2656c(b)), I am transmitting the annual report on international activities in science and technology for fiscal year 1990.

This year's report highlights the unique role of science and technology in foreign policy by focusing on six topical areas and examining how science and technology interface with foreign policy in those fields. It further explores this relationship by discussing our cooperation in these six areas with 20 countries plus two multilateral organizations, the European Community and NATO. This new format should be more effective in providing insight into the interaction between science and technology and foreign policy in the United States.

Fiscal year 1990 was a year of U.S. leadership in global environmental issues, highlighted by the White House Conference on the Science and Economics of Global Change. The year also saw continued U.S. support for international projects in space, human genetics, high energy physics, materials science, and earthquake engineering. In the human health area, prominent U.S. research collaboration with foreign countries continued in the areas of acquired immune deficiency syndrome (AIDS), vaccines against childhood diseases, prevention and control of blindness, cardiovascular disease, mental illness, and health problems of aging. Today science and technology figure prominently in the reform programs of not only the countries of central and eastern Europe, but in major developing countries as well. The long-term outlook is for further increase in the role of science and technology in foreign policy.

Sincerely,

The Honorable Thomas S. Foley
Speaker of the
House of Representatives
Washington, D.C. 20515

SCIENCE, TECHNOLOGY AND AMERICAN DIPLOMACY

Twelfth Annual Report Submitted to the Congress By the President
Pursuant to Section 503(b) of Title V of Public Law 95-426

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Executive Summary

Introduction

This report is a basic reference reviewing major international science and technology (S&T) developments and U.S. interests during Fiscal Year 1990 (FY-90), and illustrating related interactions with foreign countries. The report supports judgments that international S&T cooperation contributes to U.S. foreign and economic interests and to the advancement of science; mutual access and cooperation with the U.S. in S&T is of key interest to many countries; and U.S. participation and leadership in international S&T remain critical.

International S&T Themes

Six broad S&T themes were identified for detailed discussion in this report.

Basic Science is the search for new knowledge and/or advancement of fundamental understanding of matter and nature. Several factors warrant continuing Federal Government support for international cooperation in basic research. First, scientific work abroad has vastly expanded the global reservoir of scientific talent, from which it is useful for the U.S. to draw. Second, notable scientific advances, wherever they occur, can have important political, social and economic consequences for the U.S. as well as its partners. Third, international cooperation facilitates U.S. access to unique research facilities abroad. Fourth, many important problems in the environment, health, earth, biological and social sciences, as well as in engineering, require access to specific geographic research sites or populations outside the United States Finally, an increasing number of significant problems are intrinsically transnational or global in character.

Health continues to be a major subject on the international agenda, for example, the AIDS pandemic. International scientific cooperation in the health field is extremely useful and supports the well-being of the American citizenry, in fields including epidemiological and vaccine research, prevention and control of blindness and cardiovascular disease, neurophysiology (including the Decade of the Brain Program) and demographic transition - aging.

Environment and Global Climate Change have moved to the center of the international agenda, and must be considered in a global context. A salient feature in environmental problems is the significant scientific uncertainty associated with, for example, predicting the complex behavior of the interactive ocean-atmosphere-land system. Economic implications associated with options for mitigating environmental damage require that policy decisions be based on adequate scientific knowledge, much of it new knowledge that can come only from the pursuit of research and cooperation.

Energy has emerged again as a major international issue, especially as it relates to the environment. Increased energy demand and need for energy security have reappeared as challenges.

Economic Competitiveness has become recognized as linked with S&T. "U.S. Technology Policy," an Administration statement transmitted to Congress by OSTP in September 1990, recognizes that the Federal Government has a responsibility to encourage international cooperation in science and technology where mutually beneficial; and to help improve the flow of information about pertinent developments and advances in knowledge and practices. The issues of intellectual property rights (IPR) and equitable access by Americans to foreign S&T also pertain to economic competitiveness. These issues must be considered in negotiating and concluding S&T agreements with foreign partners.

The National Security of the United States has usually benefited from technology transfer with allies. However, U.S. interests in maintaining a technological lead in the defense area, concerns about transfers of technology, and competitiveness considerations can argue for prudence toward S&T transfers to inimical third world countries.

Countries vary considerably in their capabilities and in the opportunities which they present for S&T cooperation. Chapter 3 of this report contains discussions, keyed to the above themes, describing our S&T relationships with 20 countries and two international organizations (the European Community and NATO).

S&T Personnel Requirements and Funding

This report also responds to requirements of Title V legislation to discuss and make recommendations on personnel requirements, funding and other activities. It is increasingly apparent that skilled human resources are key to efforts to integrate U.S. interests with international science and technology matters. Many skills are necessary for U.S. Government agencies involved in S&T coooperation and policy development, the Department of State and U.S. embassies, and White House offices.

Science skills *per se* are not enough. Many assignments, such as Science Counselor or Attache in our embassies abroad, require abilities to grasp broad national interest and foreign policy considerations and their relationship to S&T, and to communicate effectively with both our foreign partners and the U.S. technical/policy agencies which rely on science officer reporting. The Department of State continually reviews the role of our science officers to determine recruitment and training requirements.

Concluding Observations

While the U.S. still leads the world in many S&T areas, the input from other countries is growing in volume and significance. The Appendix to this report includes databases for more than 600 current S&T agreements, both governmental and agency-to-agency. The material is based on information available to the Department of State from its own files or provided by other Executive Branch departments and technical agencies, but is not necessarily complete.

In considering and negotiating agreements, Executive agencies are now maintaining greater emphasis on assuring equitable access by Americans to foreign S&T, and protection of American intellectual property rights growing out of international cooperation.

The President's budget sets forth funding proposals for support of scientific and technological programs of the U.S. Government.

The intent of this and future Title V reports is to serve as the basic annual reference on the U.S. Government's international activities on science and technology.

Chapter 1

Introduction; Personnel, Funding, Intellectual Property, Comparable Access

Introduction

Organization of this Report

This Fiscal Year 1990 Title V report on "Science, Technology and American Diplomacy" is the twelfth such annual report submitted by the President to the Congress. Chapter 1 recites the Title V legislation, and discusses personnel, funding, intellectual property protection and comparable-access issues.

Chapter 2 depicts recent major pertinent international developments and how American diplomacy was involved. That discussion is arranged under the following international S&T themes:

- Basic Science;
- Health;
- Environment and Global Change;
- Energy;
- Economic Competitiveness;
- National Security.

Chapter 3 contains country narratives on 20 selected countries, the European Community (EC) and NATO. Each narrative is arranged around the themes listed above.

Chapter 4 contains conclusions and recommendations.

Appendix 1 is a database of agreements listed by countries. This appendix is a tabular catalog of science and technology cooperative agreements known to the Department of State as currently in force between the United States and other countries. Appendix 1 derives from information in the Department of State and provided it by other Federal agencies and offices.

Appendix 2 is a tabular catalog of agreements, agency-by-agency.

Appendix 3 is a bibliography of selected Agency materials.

A selective Index ends the report.

Title V Legislation (as amended)

Title V on "Science, Technology, and American Diplomacy" in the FY-79 Foreign Relations Authorization Act (PL 95-426), as amended by Section 5171 of the Omnibus Trade and Competitiveness Act of 1988, reads in relevant part as follows:

Sec. 503(b). The President shall study and not later than January 31, 1980, and not later than January 31 of each year thereafter, shall transmit to the Speaker of the House of Representatives and the Committees on Foreign Relations and Governmental Affairs of the Senate a report containing information and recommendations with respect to:

- (1) personnel requirements, and standards and training for service of officers and employees of the United States Government, with respect to assignments in any Federal agency which involve foreign relations and science or technology;
- (2) the continuation of existing bilateral and multilateral activities and agreements primarily involving science and technology, including: (A) an analysis of the foreign policy implications and the scientific and technological benefits of such activities or agreements for the United States and other parties, (B) the adequacy of the funding for and administration of such activities and agreements, and (C) plans for future evaluation of such activities and agreements on a routine basis; and
- (3) equity of access by United States public and private entities to public (and publicly supported private) research and development opportunities and facilities in each country which is a major trading partner of the United States.

Personnel

U.S. embassies and consulates represent U.S. interests pertaining to significant science and technology (S&T) issues in their host countries. The embassies and consulates cover as a part of their ongoing economic and political reporting host government activities and attitudes in pertinent areas, and they present U.S. views. The Department of State assigns full-time Science Counselors or Attaches to a number of embassies in host countries of particular S&T interest and to certain international bodies such as the North Atlantic Treaty Organization. Where such counselors or attaches do not exist, Chiefs of Missions and consulate principal officers designate one or more officers, usually from economic sections, to cover S&T as a part of their normal duties. (Note: as used in this report, the term "S&T" includes, in addition to science and technology: environmental, health, population, oceans, fisheries, nuclear energy and non-proliferation cooperation, space, and advanced technology matters.)

In 1990, 28 science officers were assigned to 22 missions, as shown in Table 1. The countries or entities to which they are assigned manifest one or more of the following characteristics:

- Substantial national resources devoted to S&T;
- Significant political or economic issues associated with S&T;
- S&T activities of major interest to the United States, including cooperative bilateral programs;
- Concerns for the United States in the areas of nuclear non-proliferation, technology transfer or economic competitiveness.

Embassy and consulate science and technology officers are representatives for the United States on S&T matters. Their responsibilities include:

- Advising the Ambassador and his country team on issues related to S&T;
- Representing the U.S. Government's interests to the host government;
- Assisting in negotiation of cooperative agreements and implementation of cooperative programs between U.S. agencies and host country organizations;
- Analyzing and reporting significant S&T developments in host countries.

Supervision of cooperative S&T programs is also a central element of many science officers' duties. In Brazil, China, India, Israel, Japan, Poland, Hungary, USSR and Yugoslavia, negotiation and management of major bilateral agreements is a principal duty of science officers. Under these agreements, numerous cooperative activities are authorized by management committees and commissions. Meetings of such committees and commissions provide a forum for science and technology policy discussions. Science officers at the embassies play key roles in these discussions and management decisions.

Table 1: Science Officers and Attaches (as of 9/30/90)

Post	Name	Title	Status
Belgrade	Tom Hutson	Attache	Foreign Service
Bonn	Vacant	Counselor	Foreign Service
Brussels/EC	Anthony Rock	Counselor	Foreign Service
Budapest	Vacant	Attache	Foreign Service
London	James Devine	Counselor	Limited Appt.
London	Otis Peterson	Attache	Limited Appt (LANL)
Madrid	Robert Morris	Attache	Foreign Service
Moscow	Jack Gosnell	Attache	Foreign Service
OECD	Daniel Dolan	Counselor	Foreign Service
Ottawa	Vacant	Counselor	Foreign Service
Paris	Michael Michaud	Counselor	Foreign Service
Paris	George Johnson	Attache	Limited Appt. (NSF)
Rome	Reno Harnish	Counselor	Foreign Service
Vienna/IAEA	Fred McGoldrick	Counselor	Limited Appt.
Vienna/IAEA	Maurice Katz	Counselor	Limited Appt. (DOE)
Vienna/IAEA	Theodore Sherr	Counselor	Limited Appt. (DOE)
Warsaw	Coleman Nee	Attache	Foreign Service
New Delhi	Peter Heydemann	Counselor	Limited Appt (NIST)
Tel Aviv	Charles Lawson	Attache	Limited Appt.
Brasilia	Barbara Tobias	Counselor	Foreign Service
Buenos Aires	Paul Maxwell	Counselor	Limited Appt.
Mexico	Leroy Simpkins	Counselor	Foreign Service
Mexico	Howard Ness	Fishery Att.	Limited Appt.
Beijing	Stephen Schlaikjer	Counselor	Foreign Service
Jakarta	Jeff Lutz	Attache	Foreign Service
Tokyo	Edward Malloy	Counselor	Foreign Service
Tokyo	James Salesbury	Fishery Att.	Limited Appt.
Seoul	Kenneth Cohen	Counselor	Limited Appt. (NRC)

Chapter 1: Personnel

OES' Role; S&T Reporting

Established in 1974 pursuant to Section 9 of the Department of State Appropriations Authorization Act of 1973, the Bureau of Oceans and International Environmental and Scientific Affairs (OES) is the Department of State's, and thereby the U.S. Government's, focal point for coordinating U.S. international S&T activities. OES is responsible for coordinating international aspects of U.S. S&T policies and activities. It assures that U.S. international S&T issues are folded with appropriate focus and emphasis into the overall U.S. foreign policy mix.

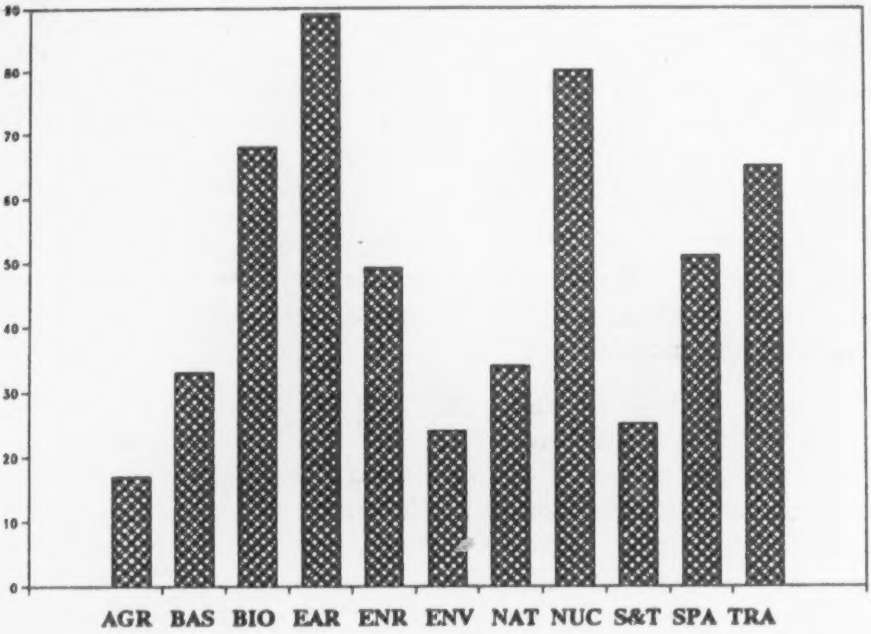
The Bureau is either directly responsible for or oversees numerous bilateral and multilateral S&T agreements. The Bureau coordinates and drafts the annual Title V report.

To perform these functions, in FY-90 OES had 154 authorized positions, 91 of which were officer positions, filled by a mixture of Foreign Service Officers, civil servants and outside appointments, and 63 administrative and support staff. These personnel are grouped in four Directorates, for Oceans, Environmental, Science and Technology, and Nuclear affairs respectively, plus a Population Coordinator. OES is also the principal interface in Washington for the 28 full time Science and Technology Counselors/Attaches and Fisheries Attaches at 22 U.S. diplomatic missions abroad.

In FY-90 OES directly managed 25 umbrella S&T agreements and exercised oversight for S&T relations with 60 countries. The majority of agreements are administered directly by U.S. government technical agencies and involve approximately 20 technical subjects (see Charts 1 and 2; Appendices 1 and 2). Also during FY-90, OES developed an Environment, Science, and Technology Resources (ESTR) statistical package to define more precisely work requirements and Bureau resources in Washington and overseas posts for the conduct of S&T affairs.

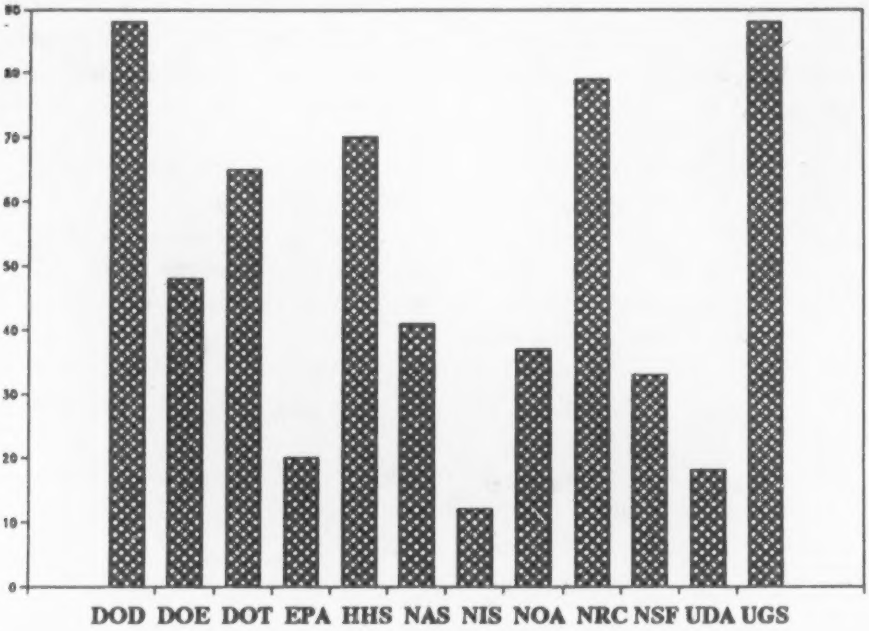
Chapter 1: Personnel

Chart 1: S&T Agreements by Subject (Selected)



Key to Subjects		
Abbreviation	**Subject**	**No. of Agreements**
AGR	Agriculture	17
BAS	Basic Sciences	33
BIO	Biomedical Sciences	68
EAR	Earth Sciences	89
ENR	Energy	49
ENV	Environment	24
NAT	Natural Resources	34
NUC	Nuclear Energy and Safety	79
S&T	S&T Umbrella Agreements	24
SPA	Space and Aeronautic Sciences	51
TRA	Transportation	65

Chart 2: S&T Agreements by Agency (Selected)



Key to Agencies		
Abbreviation	Agency	Agreements
DOD	Department of Defense	88
DOE	Department of Energy	48
DOT	Department of Transportation	65
EPA	Environmental Protection Agency	20
HHS	Department of Health and Human Services	70
NAS	National Aeronautic & Space Administration	41
NIS	National Inst.of Standards & Technology	12
NOA	National Oceanic & Atmospheric Adm.	37
NRC	Nuclear Regulatory Commission	79
NSF	National Science Foundation	33
UDA	U.S. Department of Agriculture	18
UGS	U.S. Geological Survey	88

The Department of State provides guidance to missions on incorporating science, technology and environment topics in each mission's reporting plan. This guidance periodically identifies pertinent areas of current key policy interest to the U.S. Government and the private sector. For example, guidance at the end of FY-90 included issues as follows:

- Oceans: Law of the Sea, Antarctic, Arctic, Boundaries, marine pollution, mammal-protection and fisheries issues;
- Environment and global climate change: preparations for the 1992 United Nations Conference on the Environment and Development (UNCED), the ozone layer, pollution, deforestation and species biodiversity;
- Health, life sciences and population matters;
- Science and technology: basic science, space and S&T cooperation issues;
- Energy issues, including the relationship of energy with environmental concerns;
- Nuclear energy and nonproliferation;
- S&T impacts on economic competitiveness.

Embassy and consulate S&T reporting is addressed to the Department of State but is simultaneously distributed to the White House and other Departments and interested agencies, for example, the Defense, Health and Human Services and Commerce Departments, and agencies ranging from the Environmental Protection Agency to NASA, the National Science Foundation and the National Institutes of Health.

STRIDE

Executive Order 12591 of April 10, 1987, entitled "Facilitating Access to Science and Technology," stipulated establishment of a mechanism for prompt and efficient distribution of science and technology information developed abroad to users both within the Federal government and in academic institutions and the private sector. Through a mechanism called STRIDE (Science and Technology Reporting Information Distribution Enhancement), unclassified science officer reporting is distributed by the Department of State, the National Science Foundation and the Commerce Department's National Technical Information Service to the private sector, including academic and business circles. In FY-90 some 100 STRIDE articles were distributed, principally through publication in the NTIS weekly publication, "Foreign Technology - An Abstract Newsletter." The subjects ranged from foreign S&T budgets and priorities to biotechnology, semiconductors, superconductivity and accounts of foreign cooperative endeavors and directions.

S&T Careers and Training

To increase the effectiveness of its ability to carry out science, technology and environment policies, the Department of State has established within the Foreign Service a science, technology and environment career path. This provides a career course for interested and qualified officers in addition to the Department's traditional political, economic, consular and administrative "cones." There are currently 15 Foreign Service Officers in the science career path.

The Department of State provides training for officers handling science, technology and environment issues. A Foreign Service Institute (FSI) course on Science, Technology and American Foreign Policy is offered each year for Department of State officers and other agencies. The 1990 course provided 26 officers with perspectives on current key issues in science and technology and foreign policy implications. The one-week course covered issues such as environment, technology transfer and "big science" projects (e.g. the space station). The Department of State also offers university training and outside assignments for officers interested in expanding their expertise in science, technology and environment. In Fiscal Year 1990, the exchange agreement between OES and the Los Alamos National Laboratory (LANL) provided opportunities for a Foreign Service Officer to serve as political advisor to the LANL director, and for a LANL scientist to serve in the Science Office of the U.S. Embassy in London.

Outside Recruitment of Science Officers

In addition to its provisions on STRIDE (discussed above), Executive Order 12591 provides that "The Secretary of State shall develop a recruitment policy that encourages scientists and engineers from other Federal agencies, academic institutions and industry to apply for assignments in embassies of the United States..."

It is appropriate for qualified individuals from U.S. Government technical agencies and the private sector to play a role in the conduct of U.S. international S&T and environmental activities, in positions both in Washington and at embassies abroad. Such individuals are recruited for State Department positions, including Science Officers in embassies, via appropriate channels as specific requirements are identified.

Numerous embassy science officers and OES officers have technical agency or advanced S&T backgrounds. In FY-90 these individuals ranged from neurophysiologists to biologists to chemists. As in past years, such individuals working in the State Department included three Fellows from the American Academy for the Advancement of Science who filled key positions in OES, two as geographic program officers and the third in the OES Policy Planning and Support division. In addition, during FY-90 a number of U.S. technical agencies had personnel with scientific backgrounds stationed abroad in various capacities. According to an informal tally, these included, for example, three persons from the National Science Foundation, one from the National Oceanic and Atmospheric Administration, one from the Department of Energy, approximately 20 from the Office of Naval Research, one from NASA and one from the Environmental Protection Agency. Of course, large numbers of U.S.-based technical agency personnel also deal with international R&D in the course of their own work, e.g., at the National Institute for Standards and Technology (NIST), DOE, NOAA, NASA, HHS and elsewhere.

Funding

The OES budget for FY-90 was $1,667,000. (This figure does not include salaries for domestic personnel; nor does it include salaries and expenses for science officers abroad, whose funding in most cases is from State Department regional bureaus.)

Most U.S. Government activities and programs involving international science and technology cooperation are managed and funded by individual technical agencies. This funding is not identified in detail in this report because it is usually subsumed in agency funds for programs with specific research objectives. Investigators and managers determine the degree to which international cooperation can contribute to achieving program objectives. However, in a few cases (below), consolidated funding information is available for programs which are centrally administered.

Funding data are available for programs which have specific appropriations. In Fiscal Year 1990, for example, Department of State funding for science and technology cooperation with Poland, Hungary and Yugoslavia amounted to about $4 million, as follows:

- The U.S.-Poland program, called the MSC (Marie Sklodowska Curie) Fund, was funded at $1.275 million;
- The U.S.-Hungary program was funded at $300,000;

- The U.S.-Yugoslavia program was funded at $2.396 million.

In addition, there were special programs in Israel and India based on previous appropriations. The Israeli programs are described in Chapter 3 and the appendix. For India, cooperation is based on two major bilateral agreements and are partially funded with U.S.-owned, non-convertible Indian rupees. In addition, programs funded by the U.S. Agency for International Development contribute strongly to the broad range of collaborations seen by the Indian public. Currently the United States-India Fund spends about 180 million rupees annually (about $10 million) for collaboration in science and technology. Direct support for science and technology exchanges with India by the U.S. Agency for International Development totals approximately $50 million, with annual expenditures of $5 - $10 million. There are additional details in Chapter 3.

The President's Budget presents the funding for all USG S&T activities by agency and program. One of the objectives of the President's Budget is to assure the adequacy of funding for administration of USG international S&T activities.

Nonetheless, this report provides FY-90 budgetary information in "remarks" sections of the Appendices where such data were available. The funding shown was based on a variety of sources, including U.S. government-sponsored programs, programs supported by counterpart funds (e.g., rupees in India) and programs supported by foreign governments.

Intellectual Property Rights (IPR)

The IPR Issue

Until recently, basic research was seldom considered significant in terms of potential commercial benefit to either individual investigators or the countries in which they reside. But boundary lines between basic and applied research and between research, development and commercialization have today become somewhat blurred.

Governments have long recognized the public interest in granting to inventors and authors some form of exclusive rights to their works. These rights provide incentive to invest time and money in research and development. Protection of intellectual property contributes significantly to a nation's technological progress, business competitiveness, and economic well-being. Several international conventions have been established to guarantee that the intellectual property rights (IPR) of citizens of one country are recognized in other countries as well. However, not all countries subscribe to those agreements, nor do the agreements cover all forms of intellectual property. Another significant issue involves international harmonization of intellectual property rights.

For years, U.S. international S&T agreements have been designed to provide for proper protection and equitable allocation of intellectual property that arises from collaboration. Executive Order 12591 on "Facilitating Access to Science and Technology," issued April 10, 1987, includes a requirement that each Federal agency, when negotiating or entering into cooperative R&D agreements, shall

"give appropriate consideration

- (1) to whether such foreign companies or governments permit and encourage United States agencies, organizations or persons to enter into cooperative research and development agreements and licensing arrangements on a comparable basis;
- (2) to whether those foreign governments have policies to protect the United States intellectual property rights..."

Congressional views in this regard were reiterated in 1988. Section 5171 of the Omnibus Trade and Competitiveness Act of 1988 amended Section 502 of the FY-79 Foreign Relations Authorization Act (22 U.S.C. 2656b) by adding the following statement of policy:

(5) Federally supported international science and technology agreements should be negotiated to ensure that:

- (A) intellectual property rights (IPR) are properly protected; and
- (B) access to research and development opportunities and facilities, and the flow of scientific and technological information, are, to the maximum extent practicable, equitable and reciprocal.

Development of Model IPR Annex for S&T Agreements

In January 1990 the President's Science Advisor charged the Committee on International Science, Engineering, and Technology (CISET), an interagency committee under the Federal Coordinating Council for Science, Engineering and Technology (FCCSET), to develop an approach to intellectual property protection in S&T agreements that would balance traditional norms of free and open scientific communication with the obligation of the U.S. Government to protect the ingenuity of its citizens.

The CISET recommended, and the Science Advisor accepted, a simplified, flexible approach in the form of a model IPR annex, which serves as the basis for negotiating intellectual property protection provisions in cooperative science and technology agreements. The model IPR annex language appears at the end of this Chapter. In cases where intellectual property is created in the course of a project involving a visiting foreign scientist, rights are to be assigned in accordance with the practices of the institution in which that property is created. This reflects the contribution of the institution, which has often put money, people and prestige into a research project for years. Inventors will receive royalties as is provided in U.S. law.

In the case of intellectual property created as a result of cooperative research, co-principal investigators are to enjoy exclusive rights in their own countries and to negotiate rights for the rest of the world. When one nation does not protect intellectual property that arises from joint research, worldwide rights to that intellectual property are granted to the nation that does provide such protection. The contribution of the inventor is still recognized, however, through royalties.

The guidelines accompaning the model annex recognize that in some cases intellectual property protection provisions ought to be negotiated into cooperative S&T agreements on a country-by-country or even discipline-by-discipline basis. That is, they recognize that existing laws and practices of a given country and particular characteristics of a particular scientific cooperation may require specific arrangement.

There are countries, such India and China, where existing IPR systems may not adequately protect U.S. intellectual property rights in all categories. Negotiating S&T agreements or renewals with such countries that reflect the intent of the law and Executive Order has been thereby hampered. The USG approach under such circumstances is to take these difficulties into account in deciding what cooperative activities to pursue.

Throughout the GATT negotiations, the United States has argued for a comprehensive agreement including strong standards of protection in all intellectual property areas (patents, trademarks, copyrights, semiconductor chip mask works, trade secrets, etc.); effective enforcement of these standards both at borders and internally; and dispute settlement provisions that allow signatories to bring the full weight of the GATT to bear to enforce obligations under the agreement.

Comparable Access

Generally speaking, U.S. individuals and technical agencies do not encounter specific barriers to access to foreign S&T. More often, limitations on U.S. access are the result of limited U.S. program and human resources, such as language capabilities and willingness to spend extensive periods in foreign laboratories. With regard to EC programs, a number of American companies and trade associations have indicated that, while E.C.-funded R&D programs generally are open to U.S. firms, it is not on the same basis on which European companies can participate in these programs. Some Europeans also see asymmetry in the other direction. Progress was made in 1990 when IBM was formally offered the opportunity to participate in JESSI, the European semiconductor consortium.

Scientific relations with Japan have probably been subject to more intense scrutiny on the comparable access issue than those with any other country. The bilateral science and technology agreement signed by President Reagan and Prime Minister Takeshita in June 1988 includes several provisions aimed at maintaining equity of access between the two countries. In particular, the agreement specifies the creation of a Joint Task Force on Access to assure comparable access to research facilities by investigators from each country.

Early in 1990, the Task Force conducted a survey of the experiences of 94 U.S. investigators who had spent at least two months in a government or government-supported research facility in Japan, and 137 Japanese investigators with comparable experience in the United States. Results of that survey, discussed at an April 1990 Washington, D.C. meeting of the Task Force, indicated that there were no major problems with access by scientists on either side. One accomplishment of the Task Force this year was establishment of the Summer Institute, through which 25 American graduate students in science and engineering spent the summer in Japan to study the Japanese language and work with Japanese researchers.

The Japanese government supports several programs for foreign research visitors; 85 Americans participated in 1990. It is of considerable importance, however, to make further progress in insuring access to all Japanese labs including industrial facilities supported by the Government of Japan.

Other major S&T agreements with Italy and Hungary have similar equity of access provisions. Negotiations with the European Community (EC), for example, included discussions of access to EC programs such as the Joint European Submicron Silicon Initiative (JESSI). Joint commissions for Italy and Hungary met during Fiscal Year 1990 to review access by both sides' scientists.

Of course formal guarantees of comparable access cannot achieve their objective of returning benefits of basic research to the United States unless U.S. scientists and engineers are prepared to take advantage of research opportunities abroad. For that reason, Federal agencies are taking steps to encourage more foreign mobility by U.S. scientists and engineers at all levels. For example, the National Science Foundation has maintained bilateral scientific relations with Japan and had an office at the U.S. Embassy in Tokyo for almost 30 years, and is actively promoting visits and sojourns in Japan by American scientists and experts.

Text of Model IPR Annex

Pursuant to article X of this agreement:

The parties shall ensure adequate and effective protection of intellectual property created or furnished under this agreement and relevant implementing arrangements. The parties agree to notify one another in a timely fashion of any inventions or copyrighted works arising under this agreement and to seek protection for such intellectual property in a timely fashion. Rights to such intellectual property shall be allocated as provided in this annex.

I. Scope

a. This annex is applicable to all cooperative activities undertaken pursuant to this agreement, except as otherwise specifically agreed by the parties or their designees.

b. For purposes of this agreement, "intellectual property" shall have the meaning found in article 2 of the convention establishing the world intellectual property organization, done at Stockholm, July 14, 1967.

c. This annex addresses the allocation of rights, interests, and royalties between the parties. Each party shall ensure that the other party can obtain the rights to intellectual property allocated in accordance with the annex, by obtaining those rights from its own participants through contracts or other legal means, if necessary. This annex does not otherwise alter or prejudice the allocation between a party and its nationals, which shall be determined by that party's laws and practices.

d. Disputes concerning intellectual property arising under this agreement should be resolved through discussions between the concerned participating institutions or, if necessary, the parties or their designees. Upon mutual agreement of the parties, a dispute shall be submitted to an arbitral tribunal for binding arbitration in accordance with the applicable rules of international law. Unless the parties or their designees agree otherwise in writing, the arbitration rules of UNCITRAL shall govern.

e. Termination or expiration of this agreement shall not affect rights or obligations under this annex.

II. Allocation of Rights

a. Each party shall be entitled to a non-exclusive, irrevocable, royalty-free license in all countries to translate, reproduce, and publicly distribute scientific and technical journal articles, reports, and books directly arising from cooperation under this agreement. All publicly distributed copies of a copyrighted work prepared under this provision shall indicate the names of the authors of the work unless an author explicitly declines to be named.

b. Rights to all forms of intellectual property, other than those rights described in Section II(A) above, shall be allocated as follows:

1. Visiting researchers, for example, scientists visiting primarily in furtherance of their education, shall receive intellectual property rights under the policies of the host institution. In addition, each visiting researcher named as an inventor shall be entitled to share in a portion of any royalties earned by the host institution from the licensing of such intellectual property.

2. (a) For intellectual property created during joint research, for example, when the parties, participating institutions, or participating personnel have agreed in advance on the scope of work, each party shall be entitled to obtain all rights and interests in its own territory. Rights and interests in third countries will be determined in implementing arrangements. If research is not designated as "joint research" in the relevant implementing arrangement, rights to intellectual property arising from the research will be allocated in accordance with paragraph IIb1. In addition, each person named as an inventor shall be entitled to share in a portion of any royalties earned by either institution from the licensing of the property.

(b) Notwithstanding paragraph IIb2(a), if a type of intellectual property protection is available under the laws of one party but not the other party, the party whose laws provide for this type of protection shall be entitled to all rights and interests worldwide. Persons named as inventors of the property shall nonetheless be entitled to royalties as provided in paragraph IIb2(a).

III. Business-Confidential Information

In the event that information identified in a timely fashion as business-confidential is furnished or created under the agreement, each party and its participants shall protect such information in accordance with applicable laws, regulations, and administrative practice. Information may be identified as "business-confidential" if a person having the information may derive an economic benefit from it or may obtain a competitive advantage over those who do not have it, the information is not generally known or publicly available from other sources, and the owner has not previously made the information available without imposing in a timely manner an obligation to keep it confidential.

Chapter 2

Science and Technology Themes and Developments

Introduction and Definitions

In July, 1990 the Committee on International Science, Engineering and Technology (CISET) of the OSTP-chaired Federal Coordinating Council on Science, Engineering and Technology (FCCSET) designated six current, over-arching S&T themes to be the framework for this Title V report. These themes were stipulated as follows.

Basic Science

Basic science is the search for new knowledge and/or advancement of fundamental understanding of matter and nature. Unlike applied sciences, international cooperation in basic science research tends to be least encumbered by political, commercial and technological barriers. Basic science forms the core of international scientific cooperation. A corollary of the openness, objectivity and freedom of inquiry which are hallmarks of basic science is that its benefits are automatically available to the world community. An outgrowth of this characteristic has been the growing international sharing of funding and participation in large basic science projects, such as the Superconducting Super Collider (SSC), the Hubble Telescope, Space Station Freedom, the Human Genome Project and the U.S. Global Change Research program.

Health

Health issues continue to be major items on the international agenda. For example, the AIDS pandemic has the potential for inflicting significant loss of life within the economically active segment of nations' populations. Also, industrialized countries are faced with aging populations, with attendant problems and impacts on economic productivity. Health problems of developing countries also continue to be an issue of concern, as for example in U.S.-Japan cooperation on malaria research.

Environment and Global Climate Change

Environment and global climate change have moved to the center of the international political agenda. It is now accepted that many environmental issues, including the effect of population on the environment, must be considered in a global context and addressed through international political and S&T cooperation. Basic scientific research must address uncertainties about the mechanisms and rate of global climate change; about loss of biological diversity; about impact of acid precipitation on forests; and many other fundamental environmental processes. S&T will help to monitor the extent of problems and to devise appropriate response strategies, solutions and less environmentally intrusive products and production techniques.

Energy

Energy has emerged again as a prominent international concern. Rising costs of energy supplies and environmental impacts of energy use will serve as principle driving forces behind related research in the 1990's. Increasing energy demand, particularly in newly industrializing countries, heightens these concerns. The search for cost-effective alternative supplies from renewable sources, and more efficient and cleaner utilization of conventional energy resources will figure greatly in R&D strategies. Basic research in fields such as "warm" superconductors could provide breakthroughs in the search for more efficient utilization of energy. Advanced nuclear power and clean coal technologies could buttress efforts to provide more environmentally benign energy sources. Other advanced countries are placing major emphasis on these research efforts.

Economic Competitiveness

S&T and economic competitiveness have become widely recognized as closely linked. S&T interfaces with the commercial domain in two respects: development of new products or service capabilities, and enhanced production techniques. Dedicated and well-trained labor have been key ingredients of economic success stories in, for example, the Pacific Rim, but improvements in production techniques have also been indispensable. U.S. economic success in the future will depend greatly upon the ability both to cooperate (information access, collaborative R&D, IPR protection, GATT), and to compete internationally in fields such as computers, integrated manufacturing systems, materials development and biotechnology.

National Security, broadly defined

In the emerging "beyond containment" era, as in the past, national security is an interweaving thread between the other themes. The United States seeks to enhance its security via promotion of international cooperation on defense science and technology among allies and other friendly nations. These cooperative agreements serve to improve the effectiveness of U.S. defense, improve allied military compatibility, strengthen alliances, provide a method of burden sharing, provide market opportunities, and efficiently utilize scarce research and development resources. Conversely, strategic trade/technology transfer concerns can arise for S&T cooperative activities, including with respect to transfers from allies to inimical third world countries.

THE CENTRAL ROLE OF THE U.S. IN INTERNATIONAL S&T

Science and technology today pervade nearly all aspects of international relations. U.S. Embassies in many capitals report high levels of host country interest in bilateral S&T cooperation with the U.S. American S&T preeminence is one reason for this interest. Another is the openness and accessibility of the U.S. scientific, educational and research establishments.

Maintaining and sustaining an advanced science and technology establishment is today considered a necessary condition for industrial advancement and international competitiveness. It is an area no government wants to neglect. Access to and cooperation with the United States government in science and technology is important to the foreign policies of many countries.

FY-90 was a year of United States leadership in global environmental issues, highlighted by the White House Conference on the Science and Economics of Global Change. Science and technology figure prominently in the reform programs of not only the Eastern Bloc but in major developing countries such as China, India, Brazil, Mexico, Indonesia, etc. While countries may be distracted for a time, e.g., by current events in the Middle East, the longer outlook is only for further increase in the role of science and technology in foreign policy.

Producing young U.S. scientists and engineers with working experience abroad will be ever more important in a world with more widely distributed S&T excellence. Maintaining the flow of foreign students to this country is also important to the health of U.S. science and engineering enterprise. In recent years the nationality distribution of students coming to the United States has shifted so that at present considerably larger numbers are from less developed than developed countries. Many carry back to their native countries standards and norms learned in the U.S., and cross-fertilize colleagues with them. The U.S. science and engineering communities gain, thereby, by having cadres of U.S.-educated colleagues available for cooperative research throughout the world.

The presence of foreign scientists in the United States, including senior scientists, graduate students, and post-doctoral fellows, has an even more immediate, positive impact on U.S. science and engineering enterprise. In the physical sciences, mathematics, and engineering, foreign-born students now account for 50 percent or more of all Ph.D.'s awarded by U.S. universities. During the final research-oriented periods of their studies, these students contribute directly to basic research programs of their universities here. Those who remain in the United States after receiving their Ph.D.'s continue to contribute. Although reliable projections are difficult, there appears to be little doubt that the number of U.S.-born students earning Ph.D.'s in most science and engineering fields will decline over the decade as the American college age population overall continues to decline. Foreign-born students who remain in this country either temporarily or permanently after receiving their Ph.D.'s can help alleviate any potential human resource shortfalls in science and engineering.

It is worth noting that the number of college age students is also declining in Japan and many Western European countries, including the U.K., Germany, and France, so that those countries may experience analogous human resource problems in science and engineering. If so, competition can be expected for qualified scientists, particularly from the newly opened countries of Eastern Europe.

Chapter 2: BASIC SCIENCE

BASIC SCIENCE

Motives for U.S. Government Support

The U.S. Government supports research and development (R&D) both to meet its own direct needs and to assure that the scientific and technological infrastructure is in place to support national security, long-term economic growth, and continued improvement in the quality of life, particularly in cases where the private sector lacks sufficient incentive for adequate investment. Important examples of investments in the second category are those directed toward basic research across all fields of science and engineering, and the closely associated goal of motivating and educating young people in science and engineering.

The Federal Government supports and encourages international cooperation in basic research for several interrelated reasons. First, the United States does not have a monopoly on well-trained scientists and engineers with good ideas. Expertise and investments in basic research abroad have vastly expanded the global reservoir of scientific knowledge and talent. This makes international cooperation virtually indispensable. If the United States is to draw on the global pool of scientific knowledge for its own benefit, its scientists and engineers must maintain working contacts with their foreign colleagues.

Second, notable scientific advances, wherever they originate, can have important political, social, and economic consequences. They can therefore have important, though often indirect, influences on the foreign relations of the United States. The insights of U.S. scientists and engineers who maintain close working relations with foreign colleagues are essential in anticipating and assessing probable future impacts of scientific advances abroad.

Third, international cooperation facilitates U.S. access to unique and often expensive research facilities abroad. Many such facilities are unique and thus provide special opportunities to pursue specific lines of research. In view of the increasing costs of instrumentation in fields such as high energy physics, materials science, earthquake engineering, and optical astronomy, for example, the prevalence of one-of-a-kind research facilities is likely to increase. That virtual certitude has catalyzed informal though serious discussions among industrialized country science agencies, looking toward harmonizing the development of expensive facilities to avoid unwarranted duplication of effort, and to sharing the costs of constructing and operating very expensive facilities, often called scientific megaprojects.

Fourth, many important problems in the environmental, health, earth, biological and social sciences, as well as in engineering, require access to specific geographical research sites or populations. Cooperative arrangements with scientists and engineers from the countries involved (which are often less developed countries) can facilitate U.S. access to those sites.

Finally, an increasing number of significant problems, such as possible global warming, AIDS, nuclear waste management, and earthquake prediction are intrinsically transnational or global in character. Obtaining and analyzing the requisite information, therefore, requires the coordinated international efforts, with less developed as well as industrialized countries.

The Character of Basic Science

Basic research is normally defined as the search for new knowledge, as opposed to research aimed at specific applications of existing knowledge. Knowledge has emerged as a critical commodity of the global economy, as important as physical and labor resources were in an earlier era. Most basic research in the U.S. is performed at universities. Thus, support for basic research serves the dual purpose of providing new knowledge and helping to ensure the future availability of high-caliber scientists and engineers.

The Administration continues to place strong emphasis on support for basic research across all scientific and engineering disciplines. Even in an environment of continuing fiscal restraint, it regards such support, especially at universities, as an important factor in generating new knowledge to ensure continued technological innovation. Progress in all the topical areas considered in this report depends heavily on maintaining a vigorous national basic research enterprise.

The basic research-education link serves two functions important in the international basic research arena: sensitization of students and researchers to states-of-the art and common norms and standards, and networking. Although many indicators attest to the superb quality of U.S. science and engineering across a broad spectrum of disciplines, it is no longer true (if it ever was) that the United States is dominant in all fields. Several other industrialized countries, and an increasing number of newly industrialized and less developed countries, have developed comparable, and in some cases superior, capabilities. U.S. scientists and engineers need to maintain close contact with colleagues throughout the world if they are to keep abreast of developments in their fields. Active experience working in foreign research settings has become a desirable and sometimes necessary component both for senior scientists and in the education of young investigators at the graduate and certainly the postdoctoral levels.

U.S. International Basic Research Activities

Among the approximately dozen U.S. Government agencies that invest significantly in basic research to help fulfill their respective missions, five account for over 90 percent of all Federal expenditures: the National Institutes of Health (NIH), the National Science Foundation (NSF), the National Aeronautics and Space Administration (NASA), and the Departments of Energy and Defense. These agencies also account for the bulk of international basic research expenditures by the Federal Government.

At the international level, Federal expenditures largely support cooperative research and research-related activities of U.S. investigators, including advanced education and training abroad. Research activities include, for example: field research at foreign sites (which usually involves participation by local scientists); extended periods of residence at foreign laboratories by U.S. students and senior scientists; small-scale cooperative research projects involving a single U.S. investigator and a foreign colleague working in a U.S. laboratory or a laboratory abroad; and large, complex multinational collaborations in fields such as high energy physics and oceanography.

The United States has bilateral agreements that focus explicitly on cooperation in basic research with 25 countries. Basic research is also an important component of cooperative research conducted under the auspices of bilateral agreements in other areas such as health. In addition, basic research is conducted under the terms of broader agency-to-agency and general umbrella agreements between governments that do not explicitly refer to it as such. However, most Federally-supported basic research with international implications takes place outside the terms of any bilateral agreement. That is, support is provided to U.S. investigators for projects whose international implications arise from intrinsic scientific problems and opportunities rather than in fulfillment of the terms of any formal agreement, and whose merits are determined on the basis of peer or other scientific merit review.

Chapter 2: BASIC SCIENCE

The quality of the Federally-supported basic research conducted by U.S. scientists and engineers in the international context depends in large measure on its investigator-initiated character; the decentralized, pluralistic way it is supported helps to assure a rich variety of ongoing projects, with respect to both the foreign countries and the disciplines involved. However, because of the multiplicity of world-wide basic endeavors, the cost of research facilities in several critical fields, and the complexity of many large scale projects, several mechanisms have evolved for international coordination and planning. These include informal consultations between Federal agency operating officials and their foreign counterparts; formal joint commissions established under auspices of bilateral agreements; consultations under auspices of official intergovernmental organizations such as the International Oceanographic Commission (IOC) or the World Meteorological Organization (WMO); and meetings organized by nongovernmental multilateral bodies such as the International Council of Scientific Unions (ICSU).

The heads of those agencies in North America, Europe, and Japan which bear principal responsibility for supporting basic research in their respective countries have met on an approximately annual basis since 1979 for off the record discussions of issues of common concern. The tenth of what are officially called Meetings of Presidents of Research Councils was held near Munich, Germany, in May 1990. The Director and Deputy Director of NSF participated, along with counterparts from the UK, France, Germany, Italy, Sweden, Canada, and Japan.

Senior U.S. scientists frequently conduct basic research at foreign laboratories under terms of research grants from Federal agencies, including NIH, NSF, and DOE. In addition, several programs explicitly encourage residency at foreign research sites. The NIH Senior International Fellowships program supports long-term research residency abroad for faculty members at U.S. biomedical research institutions. For less established scientists, the NATO Postdoctoral Fellowships administered by NSF enable recipients to reside at scientific facilities in other NATO countries for one to two years. NSF's Medium and Long-Term Visit Program offers possibilities for research experience at any foreign center of excellence for periods ranging from three months to two years. Additionally, recipients of honors such as the Presidential Young Investigator Awards, Office of Naval Research (ONR) grants, or the postdoctoral fellowships awarded by several of

NSF's disciplinary divisions may elect to take at least part of their tenure abroad. Finally, numerous nongovernmental organizations offer opportunities for study and research in foreign countries.

Unfortunately, relatively few U.S. science and engineering students seem to be taking advantage of opportunities for research experiences abroad. Although reliable statistics are not available, there is little doubt that the number of foreign students in science and engineering at the graduate and postdoctoral levels who work in the United States far exceeds the number of U.S. students who go abroad for extended periods of time. A 1988 survey conducted by the Institute of International Education indicated that a sizeable majority of U.S. students at all levels who study abroad are in fields other than science and engineering; in contrast, a sizeable majority of foreign students in the United States are in those fields. Language barriers are certainly one reason why more U.S. science and engineering students do not seek research experience in critical foreign countries. For example, a disproportionate number of applicants to the NATO Postdoctoral and Long and Medium Term Visit programs apply for residency in English-speaking countries.

A more significant barrier appears to be an often justifiable concern on the part of young investigators that extended residency abroad could inhibit their prospects for professional advancement. If so, then a partial solution would be to provide career incentives for foreign research experience. To that end, NSF's bilateral cooperative research programs encourage senior scientists to include graduate and postdoctoral students in their international research projects. NSF is also studying the feasibility of other possible initiatives to increase the international mobility of young scientists and engineers.

Advanced Countries

Advanced countries of Western Europe, Japan, Canada and Israel are the leading basic research partners of the United States. The United States has the largest number of science and technology agreements and programs with these countries. These countries also are the major participants in big science programs. In addition, NATO, the European Community and Economic Summits play parallel roles in enhancing science and technology cooperation. Growing cooperation continues with all advanced countries in today's frontier areas of basic research - space, nuclear energy, and materials research (including superconducting materials).

Chapter 2: BASIC SCIENCE

Among the advanced countries, Japan is an increasingly attractive partner in basic research. Japan's expenditures on basic science are about $15 billion a year. U.S.-Japan science and technology relations are the subject of intense scrutiny, with continuing progress in achieving the objectives of the U.S.-Japan Science and Technology Agreement. In particular, the Joint Task Force on Access meets to assure comparable access to research facilities in the two countries. A survey conducted in FY-1990 showed that 94 U.S. investigators who spent at least two months in government-support research facilities in Japan, and 137 Japanese investigators with similar experience in the U.S., had no access problems.

Federal agencies are taking positive steps to encourage foreign mobility by U.S. scientists and engineers at all levels, especially in the case of National Science Foundation agreements with the Japan Society for the Promotion of Science, the Science and Technology Agency, and the Agency for Industrial Science and Technology. The participating Japanese agencies have committed financial resources to support access by foreign scientists to Japanese laboratories. Over one hundred Americans are participating in long-term research activities in Japan under this NSF-Japan initiative. Another Fiscal Year 1990 highlight was the summer institute in which 25 American graduate students spent two months in Tsukuba Science City where they worked at thirteen government-funded institutes, and studied Japanese.

Individual Western European countries' S&T activities are vigorous. The U.S., accordingly, continues to assign very high priority to its bilateral S&T interaction with countries such as Germany, Italy, and France. The U.S. and Italy enjoy a uniquely broad and deep level of S&T cooperation, from basic physics and health research to cooperation in the development of space systems and superconducting magnets. Growing French investment in S&T enjoys general support, impelled by concerns about economic competitiveness, and independence in defense S&T. U.S. S&T relations with the U.K. remain extensive and close at all levels, both governmental and private.

Movement of the 12 Western European countries that comprise the European Community (EC) toward a single European market, often referred to as "Europe 1992," poses the likelihood of increased S&T integration also. The EC is playing an increasingly important role in applied (or "precompetitive") research in Europe, and is starting to become involved in basic research. Europe 1992 offers new opportunities for scientific cooperation with the U.S.

A new U.S.-EC Joint Consultative Group is envisaged as an informal forum for discussing science and technology issues, enhancing information exchange and facilitating cooperation, with the goal of increasing mutual understanding of U.S. and EC activities in programs relating to S&T. Also of note was establishment in September 1990 of a U.S./EC Task Force on Biotechnology, whose purpose is to increase mutual understanding of U.S. and EC activities and programs related to research in that field. The Biotechnology Task Force will keep the Joint Consultative Group on S&T regularly informed about its activities. Readers' attention is invited to individual narratives in Chapter 3 on selected European countries and on the EC.

NATO's role in basic sciences may become relatively greater as that alliance addresses new directions. Support for basic science has been at the root of NATO's science program. Fifty percent of an $11 million budget currently goes to the NATO Science Fellowship Program, supporting a total of nearly 1400 fellowships. In FY-90 NATO sponsored about 50 Advance Research Study Institutes with 9000 participants, including about 10 percent from central Europe. Under the NATO Committee on Challenges of a Modern Society (CCMS), nineteen studies are currently underway on environmental issues. U.S.-Israel basic science cooperation continued at its high level of joint research. In FY-90 approximately 130 new projects began with budgets for the year of $3.96 million. See Chapter 3 for further discussions on NATO, Israel, and others.

Central Europe and the Soviet Union

Fiscal Year 1990 was a year of dramatic changes in central Europe and the Soviet Union, with potentially significant impacts on basic research not only in those countries but with the United States as well. Political liberalization offers expanded opportunities for mutually beneficial research cooperation. The Administration has seized the opportunity for increased science and technology cooperation by initially focusing on the serious environmental problems of the region and, secondly, by strengthening and enhancing existing science and technology agreements.

The political decentralization that is accompanying liberalization is resulting in a considerably greater degree of autonomy for scientific institutions in central Europe, particularly universities. Formerly, academies of sciences in these countries were quasi-government agencies that not only conducted a great deal of both basic and applied research at their own institutes, but also controlled support for virtually all basic research support allotted to other institutions. International cooperative basic research projects were also controlled by central academy officials, who were, of necessity, the contact points for interactions between the U.S. Government and scientific organizations in those countries. A majority of central European academies of science are now in the process of devolving a good deal of their central control over basic research in their respective countries to universities and institutes, and are moving in the direction of becoming learned societies on the Western model. At the same time, newly autonomous universities are determined to obtain the resources required to conduct more substantial basic research, including international cooperative research. Although decentralization and the emergence of newly revitalized scientific centers are likely to be a source of confusion in the short run, these events should ultimately result in an enriched research environment with attractive opportunities for U.S. scientific participation.

Peer reviewed research proposals evaluated by NSF indicate that centers in several central European countries, notably Hungary, Czechoslovakia, and Poland, have been able to maintain their long-standing traditions of excellence in science and engineering. For example, Poland excels in mathematics, astronomy, theoretical physics and materials research; Hungary in mathematics, physics, and life sciences; and Czechoslovakia in chemistry and materials research.

As noted in Chapter 1, Department of State FY-90 funding for science and technology cooperation with Poland, Hungary, and Yugoslavia, totalled approximately $4 million as follows:

- The U.S.-Poland program, called the MSC (Marie Sklodowka Curie) Fund: $1.275 million.
- The U.S.-Hungary program: $300,000.
- The U.S.-Yugoslavia program: $2.396 million.

NSF has maintained a basic research agreement with Hungary for 16 years, has established such agreements more recently with Czechoslovakia and Poland, and also maintains modest official relations with Bulgaria and Rumania. These agreements have been important vehicles for enabling relatively small but excellent research groups in these countries to maintain contact with their U.S. counterparts.

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Political changes are having a particularly noteworthy effect on basic research in the Soviet Union. Soviet scientists are able to travel more freely and express themselves more openly. A goal of many of these scientists is to develop a system of financial support more responsive to the initiatives of individual scientists. In February 1990, NSF arranged a special week-long program for a delegation of Soviet science managers who came to Washington to learn how NSF operates. Their goal was to establish a system for supporting "bottom-up," individual investigator proposals on a competitive basis as NSF does.

The United States is well poised to facilitate new opportunities for basic research cooperation with the Soviet Union. In January 1989 the U.S. Government concluded an agreement with the USSR in the basic sciences. Two memoranda of understanding have been concluded under that agreement. One is between NSF and the Academy of Sciences of the USSR to support cooperative projects proposed jointly by U.S. investigators and their Soviet counterparts in seven basic research fields in which the Soviets are acknowledged to be conducting outstanding work. The fields are: mathematics, theoretical physics, Arctic research, geosciences, chemistry, life sciences, and engineering sciences. The agreement also specifies interchanges in the area of policy research. It focuses on cooperation between individual U.S. and Soviet scientists. This "bottom-up" approach is an important departure from previous agreements in which cooperative projects were negotiated between institutions rather than individuals. The second MOU, under the U.S.-Soviet agreement concerns geoscience cooperation projects between the U.S.G.S. and the USSR Ministry of Geology.

In April, NSF and the Academy of Sciences of the USSR convened a joint workshop in Washington on science and engineering indicators, with the objective of exchanging information on the methodologies and assumptions used to gather and analyze statistical data relative to such issues as R&D expenditures and allocations, and human resource availability in the two countries.

Developing Countries

Developing countries are emerging as major contributors in basic sciences, especially in areas which require limited equipment and resources but are manpower intensive. Whether in Mexico, Brazil, India, or Indonesia, top government levels are interested in bilateral basic science cooperation with the U.S. Some of the most eminent and well-known of developing country scientists are working in the United

States and are a beacon to the research communities in their countries of origin. For example, two of America's Nobel laureates in science are of Indian origin, another two of Chinese origin.

An especially important attraction for scientific cooperation with developing countries is their location for the study of areas such as biology, oceanography, geology and climate. They are prime sites for research on, for example, ocean currents, earthquakes and ozone. All of the scientific priority areas in the U.S. are also emphasized in India, China, Brazil and Mexico. Thus, for example, materials science, high-temperature superconductivity, biotechnology and genetic engineering and remote sensing are areas of developing country cooperation with the U.S. In India there are more than one hundred collaborative physical science projects funded either by the Indo-U.S. Rupee Fund or the Indo-U.S. Science and Technology Initiative. China's policy makers, while stressing the need for applied technology, point out that their scientific achievements in rocketry, space and nuclear energy came from their basic research institutions. Cooperation under the U.S.-PRC Protocol on Basic Sciences, slowed since the trauma of 1989, continues with some bilateral projects. The successful operation of Beijing's electron-positron collider is a demonstration of advancing Chinese capability.

The Minister of Science and Technology of Indonesia supports a broad spectrum of U.S.-Indonesian basic research. USAID is an important funding agency for bilateral basic research cooperation with Indonesia. A major joint U.S.-Indonesian ocean survey program, led on the U.S. side by the Naval Oceanographic Office, will produce nautical charts for the Indonesian Archipelago. The U.S. contributes $15 million annually to this project, and benefits from the improved charts and oceanographic data which result from the research.

The U.S. has historically had close science and technology cooperation with South and Central American countries. Major U.S. partners in the region are Mexico, Brazil and Argentina. The U.S.-Brazil Presidential Science and Technology Initiative (STI) has led to increased cooperation with Brazilian researchers in such areas as health, oceanography, meteorology, chemistry, and control of plant and animal pests. Argentina's forte in basic sciences is theoretical training and a tradition of international cooperation. USGS has established a new Center for Inter-American Mineral Resource Investigations in Tucson, Arizona to further this field in the Americas.

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Major Science Projects

The benefits of international cooperation in basic science are most clearly visible in the various major science projects. FY-90 saw continued international support for projects in space, human genetics, high energy physics, materials science and earthquake engineering. Another category of major research projects -- those which require broad international participation because of the nature of the subject, such as global change -- is discussed later in this chapter.

Advances in the acquisition of scientific knowledge require progress in the development of scientific instruments. We take for granted devices such as the laser and microchip that were not even conceived of forty years ago. Such inventions, which now comprise the basis for entire new industries, were first developed and later refined in the conduct of basic research. In some fields, including high energy physics, optical astronomy, materials science, and earthquake engineering, the costs of the ever more subtle and complex instruments required have increased to a level that suggests the desirability for harmonizing individual national planning for new scientific facilities and, in the case of expensive megaprojects, sharing construction and operating costs.

One major basic research facility is the Superconducting Super Collider (SSC), a particle accelerator and laboratory which will have an unprecedented capability to advance understanding of the origins and basic constituents of matter. When completed, the SSC will accelerate proton and anti-proton beams to speeds infinitesimally less than the speed of light, and store those high energy beams in a single circular tunnel approximately 54 miles in circumference. Superconducting magnets employing frontier technologies will guide the particle beams to interaction regions where up to 100 million collisions will take place per second, and massive yet subtle detectors will probe the fundamental interactions that have taken place.

A laboratory is being built in Ellis County, Texas, to house the SSC and its related research facilities. On the basis of experience, it is anticipated that many foreign research groups will seek to make use of the Texas facility. For example, groups of foreign scientists are welcomed as a matter of routine at the Fermi Laboratory near Chicago (which is presently the world's premier high energy physics facility), even as U.S. groups regularly make use of foreign facilities such as those at the European Center for Nuclear Research (CERN) in Geneva, Switzerland.

Because foreign groups are expected to make use of the SSC, it is reasonable to seek substantial foreign participation in its construction, now estimated to cost approximately $8.2 billion. The Administration expects that one-third of the total project funding for the SSC will come from non-Federal sources. To that end, Government officials have been negotiating with foreign counterparts in an attempt to obtain cost-sharing commitments. In May and June 1990, a delegation headed by Deputy Secretary of Energy W. Henson Moore visited Japan and Korea for that purpose, carrying a Presidential letter formally inviting participation by those countries in the SSC project. Delegations of scientists and of DOE officials have visited Western European and Canadian laboratories to provide in-depth briefings on the SSC and to ask scientists there to seek support from their governments. The Government of India has promised to contribute to the development of the project.

While not as costly as the SSC, exploiting scientific opportunities in fields other than high energy physics also requires facilities whose cost and scale have reached a level sufficient to warrant coordination of individual national efforts. For example, technologies now exist for the construction of ground-based optical telescopes with far greater capacity to produce sharp images of celestial objects, as well as to detect much fainter, more distant objects than the 5-meter telescope at Mt. Palomar in California. Beyond the possibility of shared funding, coordinated design and management of several similar if not identical telescopes located in different parts of the world would facilitate implementation of long-term research programs on a international, cooperative basis.

At a May 1988 meeting of the Presidents of Research Councils, an ad-hoc Joint Working Group on Ground-Based Astronomy was established with representation from the U.S., UK, Canada, Germany, France, Italy, and Japan. The purpose of that group, whose work continued in FY-90, is to discuss the feasibility of joint and/or parallel programs to design, construct, and operate state-of-the-art optical telescopes. The discussions have been productive. In its report to the May 1990 meeting of the Research Council Presidents, the group reported its conclusions that:

- The U.S., UK, and Canada should seek funds and begin negotiations leading to construction of two 8-meter telescopes, located in the Northern and Southern Hemispheres respectively;

- Strong endorsement should be given to a proposed Japanese project for an 8 meter-class telescope on Mauna Kea in Hawaii;
- Commitments made by European participants to develop and construct an instrument comprised of four coupled 8-meter telescopes at the European Southern Observatory in Chile were welcomed. The Joint Working Group also recommended that multinational support be given for the design, site survey, and development of key technologies for a prospective Large Earth-Based Solar Telescope.

Coordinated planning aimed at developing a network of facilities to detect and study gravitational waves is also continuing. The anticipated intensity of gravitational waves is so small that their detection would require large yet extremely subtle instruments effectively isolated from local sources of vibration, and located at widely separated locations. U.S. scientists have proposed to develop and construct identical, coupled facilities on the East and West coasts, comprising a National Laser Interferometer Gravitational Observatory (LIGO). The reliability and sensitivity of such detectors would be enormously enhanced by the existence of more instruments at widely separated sites. To that end, groups in the UK and Germany are discussing design and construction of a jointly-funded gravitational wave facility, christened GEO, in one of those two countries, while groups in France and Italy aim at the construction of still another, to be called VIRGO.

Separate facilities could ultimately be coupled to comprise an international gravitational observatory, opening up a new and exciting sub-field of astronomy.

Current discussions aimed at harmonizing emerging national plans for mapping and sequencing the human genome reflect the importance coordination of big science projects has assumed in the biological as well as the physical sciences. The National Institutes of Health and the Department of Energy have initiated coordinated programs to support planning for a large-scale effort to map and sequence the approximately 10 billion base pairs that comprise the complete human genetic blueprint, or human genome. The human genome project, as currently envisioned, involves cooperative work by investigators at many different laboratories. Adequate data storage, handling, and retrieval facilities to give investigators ready access to research results obtained elsewhere is a central requirement of the project. Human genome mapping and sequencing programs are also evolving in several other countries. These separate national efforts are to be coordinated through the international Human Genome Organization, or HUGO, which has received initial support from both the U.S. and the European Community.

NASA works with the international community on a variety of projects that further man's knowledge of basic science in such fields as astrophysics, space physics, and solar system exploration. The bellwethers of NASA's current activities are ongoing Space Shuttle activities, and development of the international Space Station Freedom. FY-90 saw continuing evolution of the Space Station Freedom project, with major participation by international partners, including nine members of the European Space Agency (ESA), Japan's National Aeronautics and Space Development Agency (NASDA) and the Canadian Space Agency. In late 1990, NASA, working closely with the international partners' space agencies, began reviewing how to restructure the program to stay within new budget limits.

Another development with possible ramifications for Space Station Freedom was the completion of the report of the Advisory Committee on the Future of the U.S. Space Program. In July 1990 Vice President Quayle asked Norman Augustine, the Chairman of Martin Marietta Corporation, to head a panel of outside experts to advise the NASA Administrator on overall approaches that NASA can use to implement its program in the coming decades. The report recommends that NASA take "whatever time may be needed for a thorough reassessment and the establishment of a configuration that can earn stable, long-term funding support."

Astrophysics will reap major benefits from three long-term NASA/European Space Agency (ESA) programs that culminated in 1990 launches. These were the Hubble Space Telescope, Ulysses and Astro projects. After its April 12, 1990 launch, Hubble began collecting a wealth of data unavailable from Earth-based observatories. Although a production flaw produced aberration in the optical telescope, other systems functioned flawlessly. Orbiting at an altitude of 330 nautical miles, the telescope will observe celestial sources such as quasars, galaxies and gaseous nebulae. Hubble will also monitor atmospheric and surface phenomena of other planets in the solar system.

ESA furnished Hubble's Faint Object Camera and solar arrays. ESA also provided manpower to support ongoing activities at the Space Telescope Science Institute at Johns Hopkins University. Since the Faint Object Camera can obtain images of very faint objects, it will collect information on objects at the edge of the known universe. It will also enable scientists to distinguish fine details around the nuclei of active and distant galaxies, search for black holes in nearby galaxies, and study the surroundings of such very distant objects as quasars.

ESA and NASA initiated the Ulysses program over a decade ago as a major mission to investigate the Sun. European and American instrumentation are to collect data on such solar polar phenomena as the solar wind and magnetic field structures. The Astro telescopes, carried into space by the Space Shuttle in late 1990, provided hundreds of observations of deep space targets unattainable from earth. NASA is involved in studies of global change as part of the "Mission to Planet Earth," NASA's contribution to the U.S. Global Change Research Program (this is discussed at further length in the section on Environment).

Following are other illustrative NASA international projects.

- The Roentgen Satellite (ROSAT), launched in early 1990, is a cooperative program between NASA and the German Ministry for Research and Technology to examine X-rays produced by cosmic sources.
- Galileo. Solar system exploration has been one of NASA's most active research areas. One such mission is Galileo, to Jupiter. NASA and Germany worked together on this mission to study the giant planet and its interactions with its 16 moons. Launched at the beginning of FY-90, the Galileo spacecraft passed its greatest challenge on February 9, 1990, a precise navigation of the spacecraft to increase velocity and change its flight path with a Venus gravity assist. Upon reaching Jupiter in five years, the spacecraft will use a German- provided Retropropulsion Module to maneuver in the vicinity of Jupiter and its moons.

HEALTH

Motives and Focus of U.S. Government Support

Sustaining and safeguarding human health as well as access to good preventive and curative health care are desired by all people and nations. Research has been the foundation for nearly all major advances in health over the past century: epidemiological research to gain information leading to the identification of causes, modes of transmission and disease incidence, or biomedical research to gain insight into fundamental life processes. Because disease knows no national boundaries and opportunities for scientific endeavor are worldwide, international cooperation in the health sciences has become an integral and essential component of U.S. health strategy.

The two U.S. Government agencies most actively engaged in international health matters are the U.S. Public Health Service (PHS) of the Department of Health and Human Services (DHHS), and the U.S. Agency for International Development (USAID). PHS programs seek to advance the status of knowledge in the health sciences, while USAID seeks to improve health status in developing countries and to remove the effects of poor health as major barriers to economic and social development. A significant part of USAID's efforts include the support of international family planning programs and programs in maternal and child health. USAID administered $280 million in population assistance programs in FY-90, including $35.8 million from the Development Fund for Africa and $18.6 million from the Economic Support Fund. Overall U.S. international population policy is managed by the State Department Office of the Coordinator for Population Affairs, but no specific appropriation is allocated for the Office of the Coordinator. Programs and activities may be carried out under broad S&T agreements entered into by the Department of State, under USAID's or HHS' own bilateral agreements with other countries, through arrangements with multilateral organizations, and combinations of these various mechanisms. PHS agencies alone are currently engaged in some 50 bilateral international health science and technology cooperation agreements. PHS' international activities encompass the full range of scientific interests of the PHS Agencies, including all of the Institutes of the National Institutes of Health, the Agency for Health Care Policy Research, the Alcohol, Drug Abuse and Mental Health Administration, the Centers for Disease Control, the Health Resources and Services Administration, and the Food and Drug Administration.

Following is a partial list of PHS interests which entail international cooperation:

- arthritis
- biomedical resources development
- cancer
- cardiovascular disease

- child health and development
- dental health
- disease prevention and control, including tropical medicine and vaccine development
- emergency medical services
- environmental health, including toxicology
- food and drug consumer protection, including quality control in such areas as biologics
- gerontology
- health services research, including health manpower development
- immunology
- medical ethics
- mental health and neurology
- medical library science
- metabolic disorders
- nutrition
- pulmonary disease
- reproductive physiology
- substance addiction
- vision research

USAID interests include research and technologies related to child survival, including immunization, behavioral research; nutrition; reproductive research; tropical medicine and other areas germane to health in the developing world. Voluntary family planning continues to play a vital role in U.S. development assistance. Expanding the number of contraceptive methods available in developing countries is a critical component of USAID family planning assistance. A number of advances in contraception have been made in recent years with USAID funding, including the development of the Norplant contraceptive implant system, improved barrier contraceptive methods, improved spermicides, and improved vasectomy techniques. Advances made for developing countries may lead to increased options for Americans.

The present chapter focuses on selected areas in the health field seen as important areas for international cooperation in the 1990's. It is not intended to address all of the above topics. Rather, the intent is to depict selected issues, their importance to the U.S., and pertinent international cooperation. Topics not covered may be addressed in future Title V reports. This material also gives an important picture of the complexity of international involvement in U.S. health science programs. These programs almost invariably involve a network of relationships and activities, including Federal Government scientists, university-based experts and scientists, and bilateral and multilateral partners.

AIDS (Acquired Immune Deficiency Syndrome)

The shadow of the deadly human immunodeficiency virus (HIV) now stretches into virtually every corner of the globe. While a handful of countries, primarily in Asia and the Middle East, still appear unscathed, as of July 1990 more than a quarter-million AIDS cases in 156 nations were reported to the World Health Organization (WHO). Moreover, WHO reports that as many as 8 to 10 million people have been infected by the virus, a dramatic upward revision of WHO's earlier figures. Most of those 8 to 10 million people will have AIDS by the end of the decade. Of those infected, about 1 million are in the United States, but the vast majority are from sub-Saharan Africa, where the AIDS toll among young adults of both sexes and in children has been rising at a startling rate. WHO warns in the "Current and Future Dimensions of the HIV/AIDS Pandemic" that child mortality rates in sub-Saharan Africa may rise by as much as 50 percent in the 1990s. WHO also projects rising AIDS case loads in Latin American and Caribbean countries, including Haiti.

All these countries need intense prevention and control programs in the coming decade. Additional efforts also are needed in many nations in the Middle East, Asia and the Pacific where, even if HIV totals are currently low (less than 0.5 percent of the global total), figures are spiraling upward in some cases, notably Thailand and India. The only bright spot is the industrialized world, where recent epidemiologic trends suggest that new infections are decreasing somewhat. Because there is still no cure for AIDS or an available vaccine, measures to help persons avoid contracting the disease are of cardinal importance. The urgent challenge is to develop and implement prevention programs. Tracking global patterns of HIV is a significant tool of the international health community in countering the AIDS pandemic. At the same time, international efforts to develop and share basic science research in HIV/AIDS remain important.

The U.S. Department of State, the Agency for International Development and the Public Health Service have played a major role in the international mobilization to combat AIDS, a drive that first began under the auspices of WHO in 1986. Since then, the U.S. role has grown substantially, both financially and in terms of vital technical assistance to the developing world. The State Department's Senior Medical Adviser for AIDS coordinates U.S. efforts to model and understand AIDS, and to make this knowledge available to the world. The State Department's Coordinator for Population Affairs seeks to secure commitments of national governments to address the problem of AIDS. The Coordinator also seeks to assure that U.S. international population policy, including the support of condom distribution programs, bears an appropriate relationship to U.S. efforts in support of AIDS prevention. In 1987 WHO member nations created the Global Programme on AIDS, through which countries around the globe share information and receive guidance on establishing HIV/AIDS prevention and management programs. Also in 1987, the U.S. Agency for International Development, which funds approximately one-fourth of the budget for WHO's Global Programme, began its own effort to buttress national HIV/AIDS prevention programs worldwide. Working increasingly with the private sector in developing nations, the Agency's approach addresses the need for surveillance and impact assessments of HIV transmission and incidence, creation among public health officials and health care workers of an awareness of the problem, assistance with the design and implementation of HIV prevention programs, and research to determine the efficacy of interventions, which are targeted primarily at risk-taking behaviors.

Among USAID's most dramatic successes against AIDS so far is a condom-distribution program in Zaire, especially in metropolitan Kinshasa. By relying on the profit motive as an incentive rather than engaging in a large condom giveaway, USAID has seen condom distribution jump from 300,000 given away in 1987, to a projected 9 million sold this year. Owners of bars, pharmacies and stores, and even river barge operators, have made small profits on the sale of the condoms but in turn have provided critical access for these products to at-risk populations. Although USAID officials do not expect the condom sales to be a cure-all, the HIV infection rate has stabilized, and the program is considered responsible at least in part.

While not "research" per se, such efforts have contributed substantially to understanding of how transmission of AIDS can be slowed. Because this practical approach appears to work where others have failed, USAID plans similar programs in Cameroon and the Ivory Coast. In addition, the Agency is launching a number of educational and surveillance initiatives throughout Africa and in a number of other developing nations, including the Philippines and Thailand. The target is not only AIDS but a number of other tenacious but rarely fatal sexually transmitted diseases. Many of these ailments, such as genital ulcer diseases, including syphilis and chancroid, are known enhancers of HIV infection. Even garden-variety sexually transmitted diseases like chlamydia and gonorrhea are now suspected of boosting HIV vulnerability, according to new research on prostitutes in Zaire.

Together with the U.S. Centers for Disease Control in Atlanta, USAID also has worked to foil HIV entry through blood and blood products by developing a rapid diagnostic screening test. While HIV transmission through contaminated blood has been relatively low in industrialized countries, HIV-contaminated blood has remained an important public health problem in many developing nations. WHO estimates that at least 10 percent of AIDS infections in Africa occur through tainted blood. Field tests of rapid diagnostics, however, have shown that blood screening can be done quickly, efficiently and at a low cost.

Since many nations in the developing world, particularly in Africa, have only 10 cents to $2 to spend per person for all health care needs, cost is a major consideration and mitigates against the use of more expensive blood tests, much less AIDS treatments such as the costly drug AZT. As a result, the gap in survival after diagnosis for people with AIDS in the developing and the industrialized world is widening. Although virtually all people with the disease eventually succumb to the piggyback infections which take advantage of AIDS-damaged natural immunity, the industrialized world has experienced an average gain in AIDS patients' life expectancies of 1 to 2 years, according to WHO.

By contrast, durations of survival in developing nations remain short, about six months or less. Beyond short-term plans to slow HIV's course wherever possible, there is a widely acknowledged need for long-term planning as well. The U.S. Public Health Service agencies along with WHO have been extremely active on both fronts. At least eight Institutes of the National Institutes of Health are engaged in ongoing AIDS research, and five of them have earmarked funds for international AIDS activities, including WHO's Global Program. Moreover, significant technical assistance has been provided to countries upon request.

Project SIDA, initiated in Zaire in 1984, is a collaborative effort involving the Government of Zaire, the Centers for Disease Control, the National Institute of Allergy and Infectious Diseases, NIH, the Armed Forces Institute of Pathology and the Institute of Tropical Medicine in Belgium, which is providing important insights into the AIDS problem. This project is an epidemiology and laboratory research program to help prevent and control HIV infection in Zaire and to provide scientific data on HIV/AIDS to the international research community. CDC staff serve as the project director and project administration for this project, which employs approximately 120 Zairian nationals. Project SIDA cooperates closely with WHO, USAID, the World Bank, the European Community and other national and international organizations to accomplish its mission.

Project SIDA has provided much of the data we know about AIDS in Central Africa: heterosexual contact accounts for 80 percent of the cases; blood transfusions and reuse of needles account for 5 to 15 percent; and mother to child transmission accounts for 5 percent or less.

A program called International Collaboration in AIDS Research, set up by the National Institute of Allergy and Infectious Diseases, seeks to foster research between U.S. and developing world scientists on epidemiology, risk-factor analysis and case control studies. It also hopes to answer questions about how cultural, geographic and genetic differences influence the course of HIV infection. Awards have been made for collaborative research in Brazil, Malawi, Mexico, Senegal, Uganda and Zaire.

Grants by the NIH's Fogarty International Center are aimed at increasing the expertise of both U.S. and foreign scientists not only in AIDS epidemiology, but in AIDS research in general. Through a network of participating U.S. universities, five types of training are featured, ranging from basic concepts of epidemiology to the design of clinical trials and prevention research.

Chapter 2: HEALTH

Cooperative Vaccine Research

Despite the global eradication of smallpox in 1980 and more progress since, infants and children throughout the world, particularly in developing countries, continue to be vulnerable to a host of vaccine-preventable diseases or ones for which there is the potential for developing vaccines. Vaccine-preventable diphtheria, measles, whooping cough, tetanus, polio and tuberculosis continue to claim about 2.5 million young lives in developing countries each year. Millions more die from or suffer the consequences of other infectious illnesses which are vaccine-preventable. It is thought that 19 disease agents, many of which could be targets for new or improved vaccines, are responsible annually for 1.5 billion cases of illness and 12 million deaths worldwide.

If a vaccine is too expensive or unwieldy (requires several doses) for routine immunization programs, or if physicians and the public do not know about or trust it, its benefits are not likely to be fully realized. Need for temperature control is also a major impediment to vaccine coverage in tropical climates.

USAID and the PHS agencies have undertaken steps toward remedying obstacles to immunization in various research programs. Participants include U.S. and foreign scientists, cooperating foreign governments and private sector organizations. USAID, for example, has funded the development by the Program for Appropriate Technology in Health (PATH), a Seattle based non-profit organization, of several innovations that can be expected to make immunization efforts more efficient. Vaccine markers -- chemically treated labels that are affixed to vaccine vials -- are one innovation. The label changes color if the contents of a vial have been subjected to too much heat, making the vaccine impotent. PATH and USAID are working with the World Health Organization's (WHO) Expanded Programme on Immunization to introduce the use of Vaccine Markers for polio vaccine by mid-1991. This is important in light of the particular vulnerability of the polio vaccine and the now ongoing worldwide effort to eliminate polio by the year 2000. Meanwhile, several vaccine manufacturers have expressed interest in using the markers for the entire output of at least some of their vaccines. Significant other efforts are underway, coordinated with WHO's Vaccine Development Program. For the most part, these efforts do not fall under bilateral science and technology agreements, but are undertaken as a normal part of the grants and contracts programs of USAID and the PHS to develop new and improved vaccines. A notable exception is the intergovernmental Indo-U.S. Vaccine Program (VAP), dating from 1987.

USAID has supported a Vaccine Development and Health Research Project through a Participating Agency Service Agreement (PASA) with the Public Health Service, DHHS. The following are some illustrations of recent pertinent international cooperation.

- There are about 30 million cases of typhoid annually, mostly in developing countries, with some 580,000 people deaths each year, more than half children under the age of five. Existing typhoid vaccines are not ideal because of high adverse reaction rate and poor protection. A field study conducted in Nepal under the PHS-AID program suggests that a new (vipolysaccharide) typhoid vaccine developed by the National Institute of Child Health and Human Development is an alternative. The new vaccine proved to be extremely safe and heat-stable, and showed an efficacy of 75 percent.
- Diarrhea caused by rotavirus, a tiny wheel-shaped organism discovered only in 1973, is an even greater scourge than typhoid in most tropical countries. Rotavirus infects an estimated 140 million persons annually, of whom about 1 million, mostly infants under two years of age, do not survive. Rotavirus is also a problem in the United States in such sites as day care centers and custodial care facilities. In the U.S. it accounts for more than a third of diarrheal illness requiring hospitalization. Efficacy trials of Rhesus Rotavirus vaccine were carried out at the University of Maryland, the University of Umea in Sweden and the Children's Hospital in Caracas, Venezuela. When serotype specific immunity was discovered, and the National Institute of Allergy and Infectious Diseases (NIAID) developed vaccine strains, a large-scale field trial in Lima, Peru was initiated with the joint support of the World Health Organization's Control of Diarrheal Disease Programme. A rotavirus vaccine clinical trial is also ongoing, with both financial and technical support from the United States.
- Cholera is still a significant health problem in many parts of the world, causing some 7 million illnesses and about 120,000 deaths annually. Unlike other diarrheal diseases, cholera kills by rapidly depleting the body of essential fluids and nutrients. The existing cholera vaccine is not effective. A trial to test the

immunogenicity and safety of a candidate cholera vaccine was undertaken in Indonesia in 1990. Indian and U.S. researchers are also working together under the Indo-U.S. Vaccine Program to develop a new recombinant cholera vaccine.

- Measles is already the target of a worldwide vaccination program, but the currently available vaccine needs improved temperature stability. In addition, it is not protective for infants because of maternal antibody interference. A field trial of a new Edmonston-Zagreb (EZ) strain of measles vaccine has been underway for several years in Mexico. This is a cooperative effort between the Mexican Ministry of Health and the Centers for Disease Control, with financial support from AID. The study has demonstrated that EZ measles vaccine given to six-month-old children produced protection even in the presence of maternal antibodies. This study led a WHO Global Advisory Group to adopt a resolution recommending the use of this vaccine in infants six months of age or as soon thereafter as possible in countries in which measles before nine months is a significant cause of death. A recently initiated project in Zaire is studying the efficacy of the EZ measles vaccine in comparison to a Japanese one (AIK-C vaccine). Results of this study should be available in 1991.

- Existing vaccines that protect older children and adults against pneumococcal pneumonia do not work for infants who, in developing countries, are at high risk from acute lower respiratory infections (ALRI) of which pneumococcal infections are a major component. This is because the infants' immature immune systems do not form enough protective antibodies. Advances in vaccine development have, however, led to development of a protein-polysaccharide conjugate (melded) vaccine which is expected to overcome this limitation. A field trial locale is being developed in the Gambia in cooperation with the United Kingdom's Medical Research Council (MRC) and the Gambian Government. In Gambia, about a quarter of all infant deaths and a fifth of those in the first three months of life are ascribed to acute lower respiratory infections.

The previously-mentioned Indo-U.S. Vaccine Action Program (VAP) is a major undertaking. The program is jointly supported by the Agency for International Development, the Public Health Service and the Department of Biotechnology of India. The VAP is overseen by a Joint Working Group (JWG) which includes leading scientists of both countries. The JWG held its fourth meeting in Bethesda, Maryland in August 1990. The VAP program involves research grants to both U.S. and Indian institutions to enable scientists of both countries to work together under a jointly developed research protocol. All research proposals are subjected to scientific peer review. Eight projects have been funded thus far, including studies directed toward development of vaccines or diagnostics for cholera, Non-A/Non-B hepatitis, polio, rotavirus, and typhoid. Preproposals have been received for studies on pneumococcal infections, meningococcal diseases, canine rabies, shigella, tuberculosis and other diseases identified for cooperation under this program. At the August 1990 JWG meeting, it was agreed that workshops will be held on respiratory infections, social science, behavioral factors and the improvement of programs to deliver vaccines.

Prevention and Control of Blindness

There are at least 43 million blind people in the world and millions more with lesser degrees of visual impairment. Although at least half of all blindness can be prevented or cured, the number of blind is expected to double by the turn of the century. Both global population increase and the growing numbers of people in older age brackets more susceptible to certain eye disorders, e.g., cataracts, are contributing factors.

The primary obstacle to reducing blindness is that the majority of those afflicted live in developing countries where incomes are low and medical and public health resources are scarce. There are too few programs to meet visual needs, and many of those that exist need improvement. Moreover, a great deal of the blindness in many of these countries, particularly childhood blindness, is linked to malnutrition and infection.

The Agency for International Development and the National Eye Institute (NEI) of the National Institutes of Health have been especially concerned with childhood blindness caused by vitamin A deficiency. Although rare in industrialized nations, this type of blindness each year destroys the sight of an estimated 250,000 children, mostly under five years of age, in developing countries. Children in Haiti, Botswana, Tanzania, northeast Brazil, the African Sahel region and south and southeast Asia are most at risk.

USAID is sponsoring and supporting the Morbidity Vitamin A (MORVITA) study, a collaborative research project between scientists at Johns Hopkins University and Gadjah Mada University in Java, Indonesia. The project seeks to assess the impact of a low-cost nutritional supplement on the ocular and overall health status of poor children, with the expectation that success, if attained, can be replicated elsewhere. The Indonesian Ministry of Health is participating as well. AID is also supporting other vitamin A and related nutritional research.

An operations research study on Vitamin A interventions in Nepalese children is in progress. The purpose is to identify the most cost- effective strategies at varying resource levels for control of vitamin A deficiency in Nepal, while enhancing existing indigenous skills and resources available to develop, implement, and evaluate nutrition and other health programs. The study is under the direction of the Nepal Netra Jyoti Sangh (the Nepal Society for Prevention of Blindness). It is supported through a number of sources, including USAID, UNICEF and an Italian private voluntary organization. Overall technical guidance for the U.S. input is provided by the National Eye Institute, but with technical assistance in the field through the School of Public Health of the University of Michigan. Results of this study are expected to be available in 1992, and will help the Nepalese Government make important policy decisions on its national efforts to prevent blindness.

The National Eye Institute has also been involved in important research efforts directed toward prevention of nutritional blindness in India, where an estimated 20,000 children become blind annually. NEI is working to prevent this health problem by serving as a consultant to a large field project sponsored by the Ford Foundation in India with the Aravind Eye Hospital in Madurai, to evaluate the effectiveness of frequent low-dose vitamin A supplements on the incidence and severity of clinical vitamin A deficiency and other morbidities. The objectives are to evaluate affordable and sustainable ways to prevent this blinding condition and to develop more cost-effective programs that provide vitamin A prophylaxis to populations at high risk.

Roughly half the blind in the world have untreated cataracts, which occur when the normally transparent lens of the eye becomes clouded or opaque. About two-thirds of these 22 million or so people are in developing countries, where the prevalence of cataract is many times higher than in the United States. Cataracts are not life- threatening in themselves, however the physical limitations they impose put those with them at risk of premature death, especially in developing countries. In some of these countries the death rate for people with cataracts is thought to be four times higher than for people without them. Cataracts also tend to strike earlier in many developing countries than in industrialized countries. India, where about one million cataracts are removed annually, is illustrative. An estimated 1.5 million new cases a year creates a backlog, now thought to be more than 7 million, which grows inexorably. Moreover, most of the surgical facilities are in cities, whereas most Indians live in rural villages.

NEI has been working with Indian researchers to determine risk factors for cataracts, with the hope that appropriate interventions can be developed to prevent or slow cataract development. For example, scientists at the New Delhi Centre for Ophthalmic Sciences have completed a study which looked at factors such as nutrition, sunlight exposure, and medical and drug history, in 1,441 patients who had cataracts and 549 who did not. Also in India, an NEI-assisted study of how certain types of cataracts develop is in progress in which scientists from the Indian National Institute of Nutrition and the Sarodini Devi Eye Hospital, both in Hyderabad, are collaborating with counterparts from Oakland University in Rochester, Michigan.

In another study at the Aravind Eye Hospital in Madurai, India, through an NEI contract to the Blindness Prevention Program of the World Health Organization, the use of vanadium stainless sutures as a possible replacement for silk sutures in closing incisions after cataract surgery is being studied. The metal sutures need less time to apply and, unlike silk, do not have to be removed. If the new sutures perform well in this study, they are likely to be adopted by cataract surgeons not only in India but elsewhere. This may result in greater efficiency in surgical treatment of cataracts.

In another important study involving NEI, the University of Michigan and the Aravind Hospital, Madurai, are studying how to motivate India's rural cataract-blind population to seek diagnosis and treatment. Results of the studies will be reported in three articles now awaiting publication.

NEI and the World Health Organization's Collaborating Center at Juntendo University in Tokyo have helped the Peking Union Medical College in Beijing, China, carry out a prevalence study of aging-related cataracts in Tibet. Other NEI cataract-related international collaborative research programs are based in Italy, Latin America and the USSR.

Such research is likely to benefit the United States as well as India. Although cataracts cause little blindness in the United States because they can be readily removed, they are so common in the American elderly as to impose heavy financial burdens on the Medicare and Medicaid programs.

Glaucoma is a condition in which excessive pressure inside the eyeball can cause optic-nerve damage that, if untreated, can lead to irreversible blindness. In the United States, about 2 million people have glaucoma in various stages of progression, nearly 5,000 of whom become blind from it each year and thousands of others suffer significant vision loss. Collaborative studies on this disease have been undertaken with scientists in the Soviet Union under the U.S.-USSR Agreement on Health and Medical Sciences. Teaming with State University of New York at Stony Brook and Queen Elizabeth Hospital in Barbados, NEI has fostered a study of open-angle glaucoma, Barbados' leading cause of blindness. This type of glaucoma produces advanced early visual loss and is prevalent in certain other black populations.

The NEI is a WHO Collaborating Center and has cooperative agreements with several non-governmental organizations. The purpose of such collaboration is to service and research programs to reduce the prevalence of blindness, regardless of its cause, throughout the world. As an example, the NEI has collaborated with its Brazilian counterpart, the National Institute of Allergy and Infectious Diseases, and three scientific organizations in Sao Paulo, to develop a multifaceted research program on toxoplasmosis, a parasitic disease that often results in blindness.

Cardiovascular Disease

No country escapes cardiovascular diseases, which affect hundreds of millions of people, resulting in lost productivity and other economic costs totaling hundreds of billions of dollars each year. Prevention and control of these diseases are a high priority both at home and abroad. Through national efforts mandated by the Congress and the President, initiatives set in motion by the National Heart, Lung and Blood Institute (NHLBI) of the National Institutes of Health have resulted in impressive progress in recent years. U.S. death rates from cardiovascular disease have declined significantly, yet these diseases remain the leading cause of death, disability and economic loss and are a particularly serious problem in blacks, whose rates of certain cardiovascular disorders far exceed those of whites. While the total number of

Americans with cardiovascular disease is unknown, it is at least 58 million--more than one in five. Forty million of these people are under 65 years of age.

The picture is much the same in most other industrialized countries; and, as there begins to be less nutritional deficiency and infectious and parasitic illness in developing nations, cardiovascular diseases become correspondingly greater in importance there too.

Science still has much to learn about preventing and controlling these disorders. NHLBI is at the forefront of this research internationally. International studies and comparisons are particularly relevant to advancing knowledge on how environmental and genetic factors affect cardiovascular disease patterns. This is especially pertinent for the U.S. in view of this nation's ethnic and cultural diversity.

Those collaborating with NHLBI in 1990 included the USSR, the People's Republic of China, the Federal Republic of Germany, Italy, Japan, Poland and Brazil. Each country pays for its own research, international travel for its own scientists and the domestic costs of scientists visiting from abroad. The following cases of international cooperation in the effort to prevent cardiovascular disease are illustrative. Soviet and American scientists have collaborated since 1972 to learn more about risk factors for cardiovascular disease. Over the last ten years about 10,000 men and 3,500 women in Moscow and 4,500 men and 2,300 women in Leningrad have participated as study subjects. Variations in Soviet and American life-styles have permitted many important comparisons, such as the influence of significant dietary and other differences between the two countries, whether some risk factors are unique to one or the other, and whether common approaches to prevention can be utilized in the two countries. As results have become available, they have been published in the scientific literature, put into mainstream public health practice when feasible, and given rise to further scientific questions which are being jointly pursued.

For example, data from the Soviet Lipid (blood fat) Research Clinics show that hypertension (high blood pressure) is a serious public health problem in the USSR just as in the United States. Because hypertension is a risk factor for coronary heart disease and heart failure and a major risk factor for stroke and kidney disease, it is of high- priority concern to both countries. A particular challenge is the search for causes of hypertension, which in 90-95 percent of patients are unknown. Joint research using a primate model developed at the Institute of Experimental Pathology and Therapy at Sukhumi, USSR, is expected to shed light on the role played by the nervous system and behavior in this regard. This Institute has the largest captive collection of baboons in the world. The U.S. and the USSR have also cooperated in efforts to educate the public about risk factors important in hypertension and other aspects of cardiovascular disease. A Russian film crew spent ten days visiting the NHLBI and its prevention programs during 1990 and took home footage to be shown to Soviet audiences about benefits of not smoking, eating prudently, keeping weight within normal limits and detection and control of high blood pressure.

The mortality rate for cardiovascular diseases in Japan continues to be approximately half that in the United States. Japan is nonetheless interested in prevention efforts. Joint research endeavors have focused on such areas as control of hypertension through dietary and other non-drug approaches and studies of blood pressure and other cardiovascular risk factors among children and young adults. U.S. and Japanese scientists have held a series of symposia to discuss findings and to plan further joint research. Of particular interest is that, in Japan, high blood pressure is more often followed by stroke than by heart attack, whereas it is the other way around in the United States. Since the Japanese diet is becoming increasingly westernized, joint U.S.-Japanese research programs are tracking the possibility that cardiovascular disease patterns in Japan may be headed for a change.

Diet and lifestyle patterns vary greatly in different regions of China and, until very recently, the Chinese usually lived their entire lives in the locality where they were born, eating locally grown foods. Increased urbanization is changing this pattern. U.S. and Chinese scientists began studies in 1981, using standard protocols, to monitor and analyze consequent potential shifts of cardiovascular disease risk factor patterns. The project has followed more than 10,000 Chinese men and women, both rural and urban, aged 35-54 years at the onset of the study. Results reflect that blood lipid (fat) levels in rural and urban populations studied in South China have risen dramatically over a period of more than four years, and that, consequently, cardiovascular disease will become more prevalent in South China.

NHLBI has proposed a collaborative cardiovascular disease prevention program with Egypt to focus on high blood pressure control and education. This program has been approved by the Egyptian Ministry of Health and the U.S. Agency for International Development, which is providing funds. NHLBI has also developed plans for expanded cooperation in cardiovascular disease prevention with Eastern Europe and Latin America in the coming year.

NHLBI is the World Health Organization Collaborating Center for Cardiovascular Disease for the Americas, a clearinghouse facilitating the exchange and dissemination of information. NHLBI is also active in other programs which WHO coordinates. Prominent among these is the MONICA project (Multinational Monitoring of Trends and Determinants in Cardiovascular Disease). MONICA was initiated in 27 countries, including one site in the United States, to monitor geographic variation in the major risk factors for coronary heart disease in men and women aged 35-65.

Decade of the Brain Program

As the end of the century draws near, scientists are on the brink of unraveling many mysteries of the healthy and diseased human brain. Building on dramatic neuroscience strides during the 1980s, the 1990s hold dramatic promise for medical breakthroughs in neurological and cognitive disorders, including a deeper understanding of both the developing and aging brain. Knowledge about how the brain works and what goes wrong when it is injured or diseased is a human concern that touches all nations. So too are the problems of the aging brain, especially Alzheimer's disease, and of mental illnesses that exact steep prices in human suffering and productivity loss. Also, up to 80 per cent of persons with full-blown AIDS develop nervous system damage, while nearly one-third of children born to infected mothers suffer severe developmental and neurological deficiencies.

On July 25, 1989, President Bush signed legislation to establish the 1990's as the "Decade of the Brain." Interest in the brain also has heightened internationally. Italy, where interest particularly in the aging brain goes back more than a century, quickly followed suit with its own declaration. In Eastern and Central Europe, Hungary, for example, has taken steps toward declaring the 1990's as the "Decade of the Brain."

The timing of these proclamations recognizes not only the unparalleled advances in the neurological sciences in the past ten years, but the potential benefit to the world community of intensified brain research. In the U.S. alone, an estimated 50 million people are affected each year by brain and central nervous system disorders that range from stroke, brain and spinal cord injuries, to degenerative and neurogenetic diseases and problems of muscular control and learning. Moreover, one in five Americans suffers from mental illnesses that are associated primarily with depression and anxiety diseases or with substance-use disorders.

Such statistics underlie the multidisciplinary efforts of thousands of scientists in the Public Health Service and in academic institutions, supported by PHS grants, to bring research from the laboratory to the bedside. The National Institute of Child Health and Human Development (NICHD), the National Institute on Aging (NIA) and the National Institute of Neurological Disorders and Stroke (NINDS) of the National Institutes of Health as well as the National Institute of Mental Health (NIMH) and other components of the Alcohol, Drug Abuse, and Mental Health Administration, have well-defined research agendas. A number of programs either have or have the potential for international components.

The NIMH is working with the European Science Foundation on the molecular neurobiology of mental illness, and has proposed creation of an International Neuroscience Trust that would pool the talents of scientists worldwide. NIA has worked with the World Health Organization (WHO) to establish international diagnostic criteria for Alzheimer's disease. More recently, scientists from NIA have been working with the Japanese Government, where increasing numbers of the "oldest old" (over age 85) have turned Alzheimer's into a growing concern. As one of twelve WHO Collaborating Centers in the Neurosciences, NINDS has been the U.S. center in this international program to investigate neurological disorders and develop prevention and treatment programs. Specific international research programs addressing stroke, head and spinal cord injury and epilepsy are in operation.

NINDS scientists are also cooperating with investigators in Italy. Through an Italy-U.S. agreement, for example, NINDS is supporting an ongoing, multi-center study to learn the causes of stroke and to develop new treatments. Under the U.S.-Chinese bilateral health agreement, NINDS has been investigating stroke in an area of the People's Republic of China with an extremely high rate of this malady. There are also cooperative efforts with Israel, Poland, and India, the latter two being under established bilateral S&T Agreements.

1990 saw extension of an agreement between the Alcohol, Drug Abuse and Mental Health Administration (ADAMHA) and its counterpart in India, the National Institute of Mental Health and Neuro Sciences in Bangalore. This agreement has provided a useful framework of exchanges on such topics as affective disorders, substance addiction, schizophrenia, community mental health services, child mental health and other areas. Extensive contacts with India scientists and psychiatrists under this agreement have led to the development of a number of proposals, which will be considered for support under the U.S.- India Fund for Cultural, Educational and Scientific Cooperation.

On substance abuse, under auspices of the Department of State, interested U.S. Government agencies have preliminarily assessed addiction- related research worldwide. It is hoped that this will lead to an international scientific conference in the U.S. in the first half of 1991. The purposes of the conference would be to exchange views and map courses for more specific international scientific research cooperation on studying the physiological nature of addiction and biomedical approaches to counter it.

Demographic Transition - Aging

Issues of the elderly and global aging will be integral parts of the international health community's focus for years to come, standing at center stage with child survival and the AIDS pandemic. International agencies have hitherto given little attention to the aging of the world's population. For years, reducing infant mortality and lowering birth rates were primary aims, particularly in the developing world. However, major causes of death are shifting from acute infectious childhood diseases to heart disease and chronic ailments of later life. Cardiovascular diseases are now the leading cause of death in 31 Latin American and Caribbean countries.

There were 370 million people age 60 and over in the 1980 world population of 4.45 billion. World population is expected to double by 2025 to an estimated 9 billion, but the number of 60-and-over elderly will triple to an estimated 1.1 billion. Nearly two-thirds of those elderly will be in developing countries. Global aging is a social phenomenon without known historical precedent. International agencies face new challenges in assisting nations to develop policies and programs to minimize social and economic effects of increases in the numbers of elderly, and to ensure availability of appropriate health and social services for them.

The international community first began addressing the growing health and social problems of the aging in the late 1970s. In 1980, the World Health Organization established the WHO Global Program for Health of the Elderly. Worldwide interest in aging steadily increased, with the United Nations convening an historic World Assembly on Aging in 1982 and with WHO establishing a Special Programme for Research on Aging (SPRA). The National Institute on Aging (NIA) of the National Institutes of Health provides support for SPRA under the terms of a 1987 agreement between the two organizations, including support for the SPRA secretariat, which is physically located at NIH in Bethesda.

The Agency for International Development has five-year cooperative agreements with the National Academy of Sciences to investigate aging trends and patterns worldwide and to determine implications of these trends and patterns for USAID policies. In collaboration with the National Academy of Sciences and the Bureau of Census Center for International Research, USAID also is focusing on emerging sub-issues such as how aging affects the health and economic role of women. Women make up the majority of older populations in most regions of the world, particularly in developed countries. The proportion of older women in developing countries is growing, for example, in Uruguay.

Since cross-national epidemiologic studies are needed to identify risk factors and their interactions, NIA conducts many of its studies in close cooperation with other countries. For example, a recent study of more than 5,000 older residents in Shanghai, China found that the Chinese are as likely to suffer from severe dementia as Americans. This contradicted previous research that indicated that low numbers of Chinese suffered from Alzheimer's disease, multi-infarct dementia or other severe dementias. Studies involving Japan indicated that the Japanese have a relatively much higher incidence of cerebrovascular dementias than dementias caused by Alzheimer's Disease.

Under the U.S.-USSR health agreement, NIA recently entered into an agreement with the Kiev Institute of Gerontology to explore collaborative opportunities in geriatrics and gerontology that might benefit both countries. Under the U.S.-Italy Health Agreement, NIA experts and other U.S. experts are joining forces with Italian researchers in comparing key data from people in East Boston and their relatives in Southern Italy. NIA has also established contacts with the newly-created Centre for Aging Research in India, and has become actively involved in the exchange of scientists with the Tokyo Metropolitan Institute of Gerontology. Also, NIA's Epidemiology, Demography, and Biometry Program recently established an Asia-Pacific Office in Honolulu where investigations of dementia and aging will be conducted in cooperation with the National Heart, Lung, and Blood Institute, the National Institute for Nursing Research, both of NIH, and the Department of Veterans Affairs. Other cross-national comparative research opportunities on aging will also be explored.

NIA is also working closely with WHO and its Special Programme for Research on Aging. There are currently several scientific projects in various stages, including multinational studies of age- associated dementias and osteoporosis, determinants of healthy aging, and immune function. The study of age-associated dementia is a cross-national comparative one whose objective is to delineate cultural, environmental, and other influences and risk factors that may shed new knowledge on the causation of this costly and debilitating disease. Participating countries are Canada, Chile, Malta, Nigeria, Spain and the U.S.

NIA conducts wide laboratory and clinical research at its Gerontology Research Center in Baltimore and the NIH Warren G. Magnuson Clinical Center, often in cooperation with other countries. During 1989, for example, NIA scientists worked with 46 investigators from 17 nations. In one project, visiting fellows from China, India, Japan and Spain made considerable contributions in a study on frequently- occurring deposits of cholesterol and its derivatives in the human aorta during the aging process.

ENVIRONMENT AND GLOBAL CHANGE

This section discusses the following international environmental matters:
Global Climate Change
Ozone Depletion
Acid Rain
Biodiversity
Environmental Cooperation with Eastern Europe
Environmental technology transfer
Transboundary Movements of Hazardous Wastes
Ocean and Marine Matters
Arctic

Introduction

The recent linking of the Antarctic ozone "hole" to chlorofluorocarbons, the debate over the role of human activity in global climate change, and the implications of the loss of biological diversity by destruction of tropical forests are among issues that have placed environmental concerns high on the international agenda. A salient feature in these and other environmental problems is the significant scientific uncertainty associated with predicting the complex behavior of the coupled ocean-atmosphere-land system. Formidable economic implications associated with options for mitigating negative environmental changes require that policy decisions be based on adequate scientific knowledge, much of it new knowledge that can come only from the pursuit of basic environmental research on a global basis.

An April 1990 White House Conference on "Science and Economics Research Related to Global Change" dramatized the desirability of developing sustained multinational cooperation in basic scientific and economic research on global climate change. That conference brought together senior science, economics, and environmental officials from 20 countries and two international organizations to discuss feasible world-wide efforts to understand and mitigate the effects of human activity on the global environment.

Multi-national research on the global environment requires sustained participation of scientists throughout the world, not only in industrialized countries. The prospects for this appear considerably better than even two years ago. One result of liberalization of eastern Europe and the Soviet Union has been that governments there now openly acknowledge their severe environmental problems and are seeking international assistance to alleviate them. Latin American countries, particularly tropical countries such as Brazil and Mexico, are now acknowledging their serious urban pollution problems, as well as the threat of severe loss of biological diversity with the seemingly relentless destruction of their tropical ecosystems. These countries have small but excellent groups of scientists working in the area of ecology.

Global Climate Change

Although significant uncertainties remain, scientists have estimated that global climate change resulting from pollution-induced changes in the composition of atmospheric gases could raise average world temperatures by 0.3 degrees Celsius per decade. If it were to occur, such a temperature rise would be 10 to 50 times faster than anything in recorded history. Research on climate and global change is intrinsically international in that it requires access to worldwide scientific talents, data, information, resources and facilities. As a practical matter, it also demands that many nations share the expense of increasing humankind's ability to understand and predict global change.

As noted above, significant scientific uncertainty still attends global climate change. Examples of areas requiring better knowledge from basic research include the following:

- Greenhouse gases. Better understanding of the processes that govern the sources and fate of these gasses is needed in order to provide a basis for analyzing integrated comprehensive control strategies and devising cost-benefit assessments.
- Energy and environment. Establishing scientifically- validated links between carbon dioxide emissions from power plants and changes in the mix of atmospheric gases will facilitate the assessment of different energy technologies and strategies.
- Agriculture and ecosystems. Better knowledge of linkages between crops, forests and other ecosystems with environmental conditions will enhance ability to make sound decisions about food security, forest management and the conservation of natural resources.
- Water policies. Better fundamental information on the interaction of climate and hydrological cycles can help resolve issues involving water supply and demand, and allow better planning for the allocation of water resources during emergency situations.
- Sea level change. Improved understanding of the processes that control sea level should provide predictive capability to guide policies on human coastal settlements and on wetlands.

President Bush has set in motion a comprehensive process designed to maintain U.S. leadership on issues associated with the profound economic and social implications of responding to global environmental change. The FCCSET Committee on Earth and Environmental Sciences (CEES) is the lead interagency coordinating group for climate and global change research in the United States. Participating technical agencies include the U.S Geological Survey, the National Science Foundation, the Environmental Protection Agency, the Smithsonian Institution, the Council on Environmental Quality, the National Aeronautics and Space Administration, and the Departments of Agriculture, Commerce, Energy, Defense, Interior and Transportation. The purpose of CEES is to increase the effectiveness and productivity of federal research efforts directed toward an understanding of the earth as a global system.

CEES does this in several ways, including formulating consensus strategic and scientific priorities, reviewing federal programs in earth and environmental sciences, promoting communication among federal agencies, developing long range plans, and formulating cross-cutting budget plans. CEES has been charged to design an ongoing, comprehensive, multi-year U.S. Global Change Research Program to reduce key scientific uncertainties and develop more reliable scientific predictions on which sound policy strategies can be based. CEES has established a task group to help coordinate U.S. involvement in international programs.

The agencies represented on CEES help provide funds for the scientific steering groups and planning and implementing offices that guide international research programs, such as Tropical Oceans and Global Atmosphere (TOGA), the World Ocean Circulation Experiment (WOCE), and the Joint Global Ocean Flux Study (JGOFS). The U.S., for instance, hosted an international TOGA conference in July 1990 to assess the prospects for attaining TOGA's scientific objectives by 1995, especially with respect to the proposed Coupled Ocean-Atmosphere Response Experiment (COARE). COARE is designed to improve understanding of basic experimental processes leading to improved climate models.

In 1990, CEES hosted two meetings of the informal International Group of Funding Agencies for Global Change. This group facilitates communication among national funding agencies and attempts to eliminate overlap and gaps in support of global change research internationally. Full and open exchange of data and information for global data research is a key objective of U.S. policy. The national elements of this objective have been set out by the Interagency Working Group on Data Management for Global Change. The group's goal is to work out by 1995 a national global change data and information system for use by government agencies, universities and others. To contribute to the task of developing global predictive capability, this national system should become part of a worldwide program of data and information sharing.

Thus, the U.S. government has consistently advocated full and open exchange of relevant data and information in the Intergovernmental Panel on Climate Change, the Second World Climate Conference, and other international fora. Over the past two years the U.S. has been active in all three working groups of the Intergovernmental Panel on Climate Change (IPCC). Specifically, American scientists have participated in the preparation and writing of three working group reports: "Climate Change - the IPCC Scientific Assessment," Working Group I; "Climate Change - The IPCC Impacts Assessment," Working Group II;, and "Climate Change - the IPCC Response Strategies," Working Group III. In addition, the U.S. published the report from Working Group III in 1991. In connection with the Coastal Zone Management

Subgroup of Working Group III on Response Strategies, NOAA, EPA and the Corps of Engineers hosted a workshop on "Adaptive Options and Policy Implications of Sea Level Rise and Other Coastal Impacts of Global Change." The workshop identified appropriate adaptive responses to sea level rise and suggested policy implications.

The State Department's Bureau of Oceans and International Environmental and Scientific Affairs coordinates on the full range of U.S. international environmental activities. OES' Environmental Directorate contains three offices for Environment: Global Change; Environment Protection; and Ecology, Health and Conservation respectively. The OES Oceans and Fisheries Affairs and Science and Technology Affairs Directorates and the Coordinator for Population Affairs also coordinate pertinent activities, for example, on remote sensing from space and on incorporation of environmental matters in intergovernmental S&T agreements managed by OES (e.g., with Poland, Hungary and Yugoslavia).

U.S. international scientific cooperation in environmental research covers many tasks. Following are a few recent examples.

- Under the U.S.-Soviet Environmental Agreement, a third Soviet- American Gas Aerosol (SAGA-III) experiment took place in early 1990 in the Pacific Ocean. It was conducted aboard the Soviet research vessel "Akademik Korolev." The cruise track was chosen to allow for repeated measurements of changes in atmospheric processes across the intertropical convergence zone far from anthropogenic (human) influences. High quality data were obtained that may be significant in answering questions about the fluxes and transport of radiative, atmospheric trace gases and in evaluating air-sea exchange and atmospheric processes.

- Exemplifying U.S. cooperation with the People's Republic of China (PRC), the Research Vessel Xiangyanghong (Red Sunrise) 14 carried out an eighth U.S.-PRC joint Tropical Oceans and Global Atmosphere (TOGA) cruise in June 1990. In November 1990 a workshop was held in Qingdao, PRC, to help assemble all the data collected on the cruise and to develop plans for managing and analyzing it.

- As a contribution to understanding the role of the oceans in global change (among other purposes), U.S. agencies are participating in efforts to develop and implement a global ocean observing system. Two international meetings were held in

Washington in September 1990 to begin outlining scientific requirements for this system and to develop an implementation plan.

As reflected by such examples, the U.S. is actively involved in a number of international research efforts in climate and global change. Since 1979, for example, the U.S. has played a lead role in the World Climate Research Program (WCRP) of the World Meteorological Organization (WMO), the International Council of Science Unions (ICSU), and recently the Intergovernmental Oceanographic Commission (IOC). For the past couple of years, the U.S. has been an active participant in the planning of ICSU's International Geosphere-Biosphere Program (IGBP).

Space-based remote sensing is an important tool for developing data on global environmental change. The National Aeronautics and Space Administration (NASA) and the Interior Department's U.S. Geological Survey (USGS) are supporting ground and space-based studies of global change through international agreements. U.S. activities are coordinated with those of other countries through the Committee on Earth Observations Satellites and the International Coordination Working Group - Earth Observations. NASA's Earth Science Program's goal is to obtain a scientific understanding of the entire Earth system on a global scale by describing interactions of the planet's component parts. To conduct global observations, NASA secures the participation of international partners who can make unique contributions in remote sensing areas. The following projects are illustrative.

- The U.S./French TOPEX/Poseidon project is intended to provide measurement capability to determine global oceanic circulations and study their influence on global climate.
- A U.S.-Germany Shuttle Imaging Radar mission will study several aspects of the environment including hydrology, oceanography, glaciology and ecology. Information from the mission will be used in global models of both surface and subsurface processes.
- International partners including Japan, Canada, the USSR and Europeans will launch Earth science missions carrying U.S. experiments. One example is an agreement signed in 1990 with the Soviet Union on a Total Ozone Mapping Spectrometer (TOMS) mission, consisting of a U.S.-provided TOMS launched on a Soviet Meteor-3 satellite.

Ground-based activities which complement the space-based efforts constitute one component of the "Mission to Planet Earth," NASA's contribution to the U.S. Global Change Research Program, which also includes:

- A comprehensive and integrated data system to draw maximum information from existing and upcoming missions;
- An expanded scientific research program;
- The planned Earth Observing System, a major undertaking to make comprehensive, long-term observations of the entire planet to serve as a key basis for predictive models. Over 500 scientists from 13 countries have been identified to participate in the EOS research program.

Climate change studies under USGS agreements during Fiscal Year 1990 included:

- Data collection by remote sensing from satellite imagery;
- Surveying and mapping to produce base, topographic, geologic and other thematic maps;
- Surveying and mapping in polar regions to assess changes in glaciers, ice sheets and climate;
- A worldwide International Strategic Minerals Inventory, and mineral resources research, assessment and modeling for individual countries;
- Assessment of worldwide resources of oil and gas under the World Energy Resources Program, and research, assessment, and modeling of energy resources in individual countries;
- Activities to mitigate geologic and hydrologic hazards; predictive investigations and monitoring for volcanic eruptions;
- Global research on geophysics, seismicity and earthquakes;
- Exploration research in marine geology;
- Research, assessment and modeling for climate change and atmospheric deposition programs.

In collaboration with other government agencies and independently, the U.S. Agency for International Development (USAID) is involved in several initiatives on global climate change. In collaboration with the Asian Energy Institute, USAID is working closely with Brazil and 11 Asaian countries (including India, Indonesia and China) to develop strategies to limit greenhouse gas emissions in Brazil and Asia. In collaboration with EPA, USAID is also assessing potential impact of global climate change on production and trade of agricultural commodities.

Ozone Depletion

The United States and the international community made progress in FY-90 in protecting the stratospheric ozone layer from chlorofluorocarbon (CFC) and other man-made ozone-depleting chemicals. The Montreal Protocol on Substances that Deplete the Ozone Layer, which entered into force on January 1, 1989, has now been ratified by over 60 nations, including 27 developing countries, which represent 90 percent of the total global consumption of CFCs. Parties to the Montreal Protocol have agreed to strengthen the Protocol's control requirements and trade restrictions and to establish an interim financing mechanism to assist developing countries to implement the Protocol.

At the Second Meeting of the Parties to the Protocol in June 1990, the Parties adopted a comprehensive set of adjustments and amendments to strengthen the Protocol's control, trade, financial assistance and other provisions. The Parties agreed to phase out CFCs, carbon tetrachloride and non-essential uses of halons by the end of the century, and to phase out methyl chloroform by the year 2005. They also agreed on the establishment of an interim financing mechanism in January 1991 to assist developing countries meet the "incremental costs" associated with implementing the Protocol. The mechanism includes a multilateral fund providing for $160 million over three years, with an additional $80 million to be made available if other developing countries join, and a technical clearinghouse to disseminate information and expertise.

Recognizing the importance of broad international ratification and implementation of the Montreal Protocol, the United States organized a series of international conferences, workshops and trade fairs and trade missions to assist developing countries. In April 1990, for example, the United States and India convened a joint workshop on substitute chemicals, products and technologies. The U.S. and Singapore hosted a regional conference in September 1990 on the use of CFCs and other ozone-depleting chemicals in the electronics industry.

Also in September, the U.S. and the People's Republic of China organized a conference on halon substitutes, and developed under the

U.S.-PRC Science and Technology Agreement an Annex on use of ozone-depleting chemicals in refrigeration. The United States also sent technical experts to Egypt, Brazil and Mexico to assist those nations in estimating current and future demand for ozone-depleting chemicals and the potential costs of making the transition to non-ozone-depleting chemicals.

The Environmental Protection Agency continued work with industry in promoting the development of substitute chemicals, products and technologies. EPA played a major role, for example, in the establishment of the International Cooperative for Ozone Layer Protection, a consortium of 10 major electronic firms that have agreed to work through their foreign operations, suppliers and customers to eliminate the worldwide use of CFCs. EPA also worked with the Program for Alternative Fluorocarbon Testing and the Alternative Fluorocarbon Environmental Acceptability Study, under which a large number of chemical manufacturers are conducting joint toxicity and environmental acceptability studies for substitute chemicals. Under the U.S.-Soviet Environment Agreement, in 1989, U.S. and Soviet scientists jointly carried out a Heiss Island project to study variations in the ozone layer in the Arctic, and the role that atmospheric transport processes play in determining vertical ozone distribution. 1990 saw planning for a second phase of this project in 1991.

Acid Rain

The U.S. and Canada have generally enjoyed a long history of cooperation on environmental matters. In FY-90 acid rain, however, remained the major unsolved bilateral issue.

During the 1980's, the United States and Canada discussed the possibility of a bilateral air quality accord that would address acid rain-causing sulfur dioxide emissions. These negotiations, however, failed to produce an agreement given the lack of a domestic acid rain reduction program in the United States and the unwillingness of the Canadian side to accept any agreement that did not include targets and timetables for sulfur dioxide (SO2) reductions. In mid-decade, Canada embarked on an acid rain control program. Acid rain control legislation in the U.S. was deterred by a lack of consensus in this country on how the burdens of a reduction program would be shared, as well as by scientific uncertainties. The National Acid Precipitation

Assessment Program (NAPAP), an interagency organization established in 1980 to coordinate acid rain research efforts of the U.S. Government, is addressing remaining scientific uncertainties. NAPAP has also provided a forum for research coordination with other countries, particularly with Canada.

Considerable progress has now been made in coming to grips with the acid rain pollution problem. In July 1989, President Bush submitted to the Congress proposed amendments to the Clean Air Act with provisions for curbing emissions of precursors of acid rain. In October 1990, the Clean Air Act Amendments were enacted by the Congress, with strong provisions for dealing with acid rain. This action was warmly welcomed in Canada. Formal negotiations with Canada on an air quality agreement, begun subsequent to the passage in both the House and Senate of bills dealing with the proposed amendments to the Clean Air Act, were underway. The two countries were discussing a general framework agreement that would provide a mechanism for addressing a broad array of air pollution problems. The first annex to the agreement will focus on emission reduction programs for SO2 and NOx, the principal precursors of acid rain.

Biodiversity

Global awareness has increased in recent years of the importance of biodiversity and the threats to genetic, species and ecosystem diversity from habitat destruction, overexploitation, introduction of exotic species, and pollution. Concomitantly, activities to protect marine mammals and endangered species have increased. These activities include international and national efforts to protect endangered species, such as the Convention on International Trade in Endangered Species (CITES), the U.S. Endangered Species Act, Marine Mammal Protection Act, and Magnuson Fishery Conservation and Management Act, and international efforts to negotiate a biodiversity treaty.

U.S. Government agencies involved in international cooperation in biodiversity research include the Agency for International Development, the Environmental Protection Agency, the U.S. Fish and Wildlife Service (FWS), the National Science Foundation (NSF) and the National Park Service (NPS). The EPA's Science Advisory Board and the NSF's National Science Board have identified loss of biodiversity as one of the leading environmental threats to the planet, and noted that mitigation will require a broad international research and preservation effort. EPA is expanding its research and policy programs in biodiversity both at home and abroad. Federal agencies under the aegis of EPA and the Smithsonian Institution are exploring ways to collaborate on programs and collect and disseminate information on biodiversity. In addition, biodiversity has become a major emphasis of both domestic and international environmental, conservation and resource non-governmental organizations. Several, such as the World Resources Institute and Conservation International, are developing major biodiversity programs.

USAID has a significant program for conservation of biological diversity, involving upwards of $30 million in FY-91. A ten-year program in cooperation with the World Wildlife Fund aims to provide training, research and awareness techniques to help A.I.D. recipient countries formulate conservation policies, catalog their biological resources, and strengthen their human and institutional capabilities in this area. USAID also provides funding and programmatic support to biodiversity research in developing countries under a program administered by the National Science Foundation.

USAID has tropical forestry programs for Brazil's Amazon Basin and southern Mexico. These programs will support a variety of activities, including education, workshops and institution-building. Working with EPA, USAID has commissioned the National Academy of Sciences to assess the potential of sustainable agriculture to reduce deforestation rates, identify ways to overcome impediments to more sustainable agricultural systems, and recommend sites for sustainable agriculture projects.

The U.S. Fish and Wildlife Service participates in a variety of international programs in support of biodiversity. FWS programs abroad focus on preservation and enhancement of habitats for wildlife. The FWS is the central office for U.S. participation under the Convention on International Trade in Endangered Species (CITES). As such, the FWS plays a vital role in controlling species trade. FWS scientists also provide technical assistance on CITES and participate in needed revisions to the CITES appendices.

FWS is also the U.S. coordinator for the Convention on Wetlands of International Importance (RAMSAR), particularly waterfowl habitat. As such, FWS provides technical and financial support to encourage protection and sound use of wetlands. The FWS Director is Chair of the RAMSAR Standing Committee. Senior FWS scientists and resource managers also frequently respond to a wide variety of international requests for technical, educational, and institution-building assistance on subjects as diverse as fish genetics and sea turtle management.

The National Park Service is the lead agency for implementation of U.S. treaty obligations under the World Heritage Convention (PL 96-515). The Convention recognizes and protects the most biologically diverse areas of the world. U.S. leadership and direction have contributed to safeguarding unique locales. For example, the NPS has collaborated with the Frankfurt Zoological Society to provide assistance to the Garamba National Park in Zaire in support of the World Heritage Convention. A senior NPS ecologist assisted the USSR in assessment of Lake Baikal, the world's most biologically diverse lake and a nominated World Heritage site. In FY-90 NPS entered into a three-year agreement with the Government of Thailand to assist the Royal Forest Department to strengthen management and operation of Thai national parks and wildlife reserves.

Environmental Cooperation with Central Europe

U.S. environmental programs in central Europe are expanding rapidly in light of the dramatic changes taking place in the region. In Poland, Yugoslavia and Hungary, the Environmental Protection Agency, in cooperation with U.S. Agency for International Development, has begun implementation of new initiatives under the Support for Eastern European Democracy (SEED) Act. That Act made available $10 million to provide air quality monitoring programs and upgrade water treatment systems in Poland and to establish a regional environmental center in Budapest. The Administration and Congress have proposed additional funding to extend the SEED Act to other emerging democracies in central Europe.

The Regional Environmental Center for Central and Eastern Europe was formally established in June 1990 as an independent, non-profit entity. It is located in Budapest, Hungary. An International Board of Trustees has been named to provide guidance on all center programs and activities. The Center formally opened on September 6, 1990. It will promote innovative approaches to environmental management while providing a neutral forum for environmental information and increased communication. The Center will initially target efforts on three vital areas: encouraging energy efficiency and clean energy; impacts on health caused by environmental degradation, and pollution prevention.

With USAID, EPA is establishing an energy efficiency unit in Warsaw. EPA is also developing projects in Czechoslovakia to study health effects in a heavily polluted area of Bohemia, and in Hungary on chemical energy preparedness, prevention and response. USAID has contributed funds to a major U.S. private sector power developer for a feasibility study to expand, upgrade and privatize a power plant in Warsaw, with the goal of rehabilitating it in accordance with environmental standards.

The tremendous growth of new programs and initiatives to provide assistance to central Europe has underscored the need for improved coordination and prioritization. In 1989, the Group of 24 donor countries convened an environmental working group in an effort to assure close coordination among donors providing environmental aid to central Europe. EPA has been represented at several of the G-24 meetings, and is also coordinating its efforts informally with the World Bank.

Environmental Technology Transfer

At President Bush's request, an advisory body called the "International Environmental Technology Transfer Board" was established in December 1989, headed by Browning-Ferris Industries board chairman William Ruckelshaus, "to develop options and strategies for improving U.S. public and private international technology transfer programs" in the environmental area. An interim report of the board released in May 1990 asserted that technology transfer programs designed to protect the global environment should be undertaken in the context of sustainable development. The report stressed that population stabilization programs in both developing and developed countries are a necessary condition for sustainable development.

The board judged that technology transfers could yield local benefits as well as important contributions to global environmental protection. Many projects might be funded through existing bilateral and multilateral economic assistance and environmental protection programs. Some, however, such as those associated with mitigating ozone depletion through curbs on chlorofluorocarbon (CFC) production, might require additional or concessional funding. Members of the advisory board have emphasized the importance of building indigenous capacity to use environmental technologies effectively.

Transboundary Movements of Hazardous Wastes

On March 22, 1990 the United States signed the Basel Convention on the Control of Transboundary Movement of Hazardous Wastes and Their Disposal, sponsored by the United Nations Environment Program (UNEP). The Convention requires contracting parties to provide the receiving country with advance notice of proposed shipments and to obtain prior written consent of the receiving country. The Convention also requires that the exporting country be assured that the waste will be managed in an "environmentally sound manner" in the receiving country. In addition, there are provisions for the return of illegal shipments of waste and for bilateral agreements to streamline procedures, provided that they are consistent with the purposes and aims of the Convention.

Under present regulations of the Resource Conservation and Recovery Act, exports of hazardous waste are prohibited unless advance notification has been provided to EPA of the intent to export and the receiving country has provided its written consent. It will be necessary to modify RCRA procedures somewhat to encompass certain categories of wastes (i.e., household wastes and municipal incinerator ash) not currently covered by RCRA export provisions. Most of EPA's international work on hazardous wastes has been concerned with policy issues associated with transboundary shipments. However, the agency also participates in work of the OECD examining new waste minimization and recycling technologies, and in an Economic Commission for Europe group developing low and non-waste technologies.

Oceans and Marine Matters

Although it is known that habitat destruction and degradation are adversely affecting marine biodiversity worldwide, marine biodiversity is not yet explicitly recognized in the international effort to negotiate a biodiversity treaty. Species diversity has not been well assessed in many marine habitats, and there are broad gaps in knowledge. To correct this situation, the National Oceanic and Atmospheric Administration (NOAA) is actively involved in negotiating the proposed global convention on biological diversity, to ensure that the marine environment is included in the final convention.

Potential global warming has major implications for marine ecosystems and coastlines. Recent findings indicate possible environmental changes taking place in the Northeast Atlantic. These indicators include increased incidence of paralytic shellfish poisoning (dynoflegallate blooms) in more northern waters, more northern distribution of some fish species, die-off of menhaden in shallow water, and unusual juvenile herring movements. Although these events would usually be associated with warmer water, instrument records do not show such a temperature increase. Failure to detect ocean warming along the coast, if it is occurring, could be attributable to wind-water interactions along shorelines. This could make sea-surface temperature measurements an invalid indicator of ocean temperatures, and mask warming in the oceans.

All levels of biological organization are directly and indirectly affected by temperature. Since the National Oceanic and Atmospheric Administration has regulatory authority over marine resources, NOAA is using its expertise to address climate change response of marine ecosystems by means of retrospective analyses, long-term monitoring, local-area ecosystem studies (Bering Sea, Great Lakes, North Atlantic, California Current), and modelling, including development of interdisciplinary physical, chemical and biological integrated models.

A Marine Ecosystem Response Project (MERP) reflects an integrated NOAA effort to investigate global change marine ecosystems issues transcending international boundaries. MERP is being developed to complement the work of other U.S. Government agencies, such as the National Science Foundation (NSF), and to participate in international programs such as the Joint Global Ocean Flux Studies (JGOFS) program and the Global Ocean Ecosystems Dynamics Research (GLOBEC) program.

In October 1989, NOAA and the U.S. Delegation to the Convention on International Trade in Endangered Species (CITES) spearheaded efforts to obtain international agreement on increased protection for the world's coral reefs, and succeeded in winning Appendix II listing for all genera of hard corals. Permits will be required by the 103 member countries before coral products may be imported or exported. The CITES listing of hard corals should prevent further degradation of the world's coral reefs for construction materials, aquarium supplies, and jewelry, especially in the Philippines.

Through providing technical support to the Department of State, NOAA has initiated efforts to reduce sea turtle mortality in commercial shrimp fisheries of certain Caribbean, Central, and South American countries. Negotiations have been held with officials from Belize, Costa Rica, Guatemala, Honduras, Mexico, Nicaragua, Panama and the European Community (representing French Guyana). The intent of these meetings was to obtain the cooperation of foreign governments in reducing sea turtle mortality through the introduction of turtle excluder devices (TED's) on shrimp trawls.

Through technical support NOAA has also worked with the Department of State to ensure member country compliance with the International Whaling Commission moratorium on commercial whaling, and to forestall any attempts within the IWC to undermine its conservation policy. In Fiscal Year 1990, NOAA led an interagency review of U.S. whale policy that affirmed current policy in support of the moratorium. NOAA was equally successful in stopping attempts to modify the moratorium at the 1990 IWC annual meeting.

In cooperation with the Inter-American Tropical Tuna Commission, the U.S. National Marine Fisheries Service (NMFS) has emphasized in meetings with certain Latin American tuna-fishing nations the importance of the Marine Mammal Protection Act in saving dolphins involved in the eastern tropical Pacific fishery. In several meetings, these nations have adopted the goal of the Marine Mammal Protection Act to reduce mortalities and have implemented requirements in their fleets to reduce mortality. These meetings have resulted in significant reductions of dolphin mortality. These nations are now interested in pursuing a multilateral agreement between tuna fishing nations to accommodate both national fishing interests and U.S. goals to obtain dolphin mortality rates approaching zero.

NMFS sees potential for industry-to-industry developments with central European countries in the fisheries area. A number of fishing industry representatives from the Pacific Northwest traveled to central Europe recently. There have been joint ventures with Polish fishing fleets in both the northwest Pacific and the northeast Atlantic, with fleets of the former German Democratic Republic in the northeast Atlantic, and with the Soviet Union in several fisheries.

Pressures on fishery stocks increases as new fishing technologies are developed. Driftnet fishing is an example of unregulated stresses on marine populations which can result. Driftnets take not only the targeted species, but other finfish as well as dolphins, whales, turtles, seabirds, and seals. Because the nets are made of monofilament nylon, they continue to entangle fish long after the nets become lost ("ghostnets") or are discarded overboard. A major high seas driftnet fishery has developed for squid in the North Pacific. A United Nations resolution calls for this fishing practice to end in the South Pacific in 1991 and in all other areas in 1992, unless jointly agreed conservation measure are taken. The impact of driftnet fisheries crosscut many of the ocean topics of global concern, including fisheries management, preservation of biodiversity, and protection of marine mammals and endangered species.

Arctic

The June 1990 Bush-Gorbachev summit statement emphasized the importance of coordination of global atmospheric, terrestrial and ocean monitoring systems, including the Arctic. The eight Arctic countries (Canada, Denmark, Finland, Iceland, Norway, Sweden, the USSR and the U.S.) have agreed to consider protection of the Arctic environment through meetings which began in Finland in September 1989 and continued in Yellowknife, Canada in April 1990. The cooperative international effort intends to examine the extent of Arctic contamination, develop an international sampling strategy and international database, and plan for cooperation in protecting the Arctic environment. Non-governmental national science organizations of the eight Arctic countries signed founding articles of the International Arctic Science Committee in Resolute, Canada in August 1990.

Through a mandate under the Arctic Research and Policy Act of 1984, and in cooperation with national and international programs and agreements, EPA's Arctic Long-term Environmental Research Transects (ALERT) program is focussing research on the nature, extent and effects of exposure of Arctic ecosystems to atmospheric contaminants.

This effort includes analyses of atmospheric pathways for long-distance transport and deposition, biogeochemical pathways at representative depositional sites, and intermediate and ultimate sinks for these contaminants. These studies will culminate in an assessment of risk in terms of character, magnitude and timing of changes to Arctic biological systems from atmospherically deposited contaminants. The program will implement a statistically balanced sampling design for the Arctic region. Results will lead to conclusions about the nature and extent of Arctic pollution, and will be used to develop and test assessment models for mitigation and management.

ENERGY

Introduction

This section describes Department of Energy (DOE) and Agency for International Development (USAID) international activities mostly in the conventional energy area. Several of the Chapter 3 country narratives include comments on nuclear power.

Energy is the lifeblood of modern nations; in the U.S. energy costs are approximately 10% of GNP. Energy demand in developing countries is expected to triple over the next twenty years, straining capital resources and posing a threat to the environment. Many nations tend to stress regulation and control in dealing with energy issues. The U.S. emphasizes mostly reliance on market forces to determine energy prices and availability. The U.S. has viewed research and development as the dominant and appropriate form of government involvement in the energy arena. Since R&D transcends geopolitical boundaries, international aspects of USG-supported energy R&D take on added significance.

Interlocking Considerations

Energy research and development are expensive undertakings with long lead times. It is not unusual or uncommon for 25 years to pass for a sound idea to move from benchtop to the commercial marketplace, and for costs to be ultimately several billions of dollars. The courses of fusion energy, clean coal technology and safe nuclear power are cases in point.

Expense concerns are central in U.S. international energy R&D policy, giving rise to needs to:

- stretch the dollar and share costs;
- pool international talents and expertise;
- build new partnerships to help limit dependency on uncertain suppliers of foreign oil;
- increase energy efficiency and conservation, and develop alternative clean energy sources (measures also appropriate for the U.S. to support as well-suited to needs of developing countries).

DOE Activities

The Department of Energy has significant international undertakings in all these areas. There are 166 energy-related agreements with 28 countries and two regional consortia. These agreements span the globe and include every major continent and political stripe. The precise value of this effort to the U.S. is hard to specify because many agreements involve personnel exchanges and the use of already existing facilities, but DOE estimates conservatively that its international agreements represent a net U.S. savings of nearly $200 million per year. Some highlights of agreements provide a snapshot of DOE's overall international energy R&D program.

- Stretching the dollar. This area comprises 45% of the Department's agreements and includes such major undertakings as fast breeder reactor development with EC countries; fusion energy development with Japan, the EC, and the USSR; and the Superconducting Supercollider.
- Pooling talents. The Department's agreements in this area constitute 25% of the overall effort.
- Building new partnerships. 8% of the Department's agreements fall in this category, representing a significant effort aimed at making other resource bases accessible. There is an umbrella agreement with Canada, with four sub-agreements related to characterization of Canada's immense Athabasca tar sands

reservoir, and ways economically and cleanly to extract oil from it. The Department has five agreements in Venezuela aimed at helping use of enhanced oil recovery techniques for more economic access to that country's extensive fields of heavy crude. In Mexico there is an umbrella agreement on petroleum resource development, and in India a major effort on enhanced oil recovery (EOR) and underground coal gasification.

- Increasing energy efficiency. This is a major category in DOE's international energy development program, comprising over 22% of all the agreements supported by the Department. There are nine activity areas: coal, renewables, environmental, geothermal, conservation, nuclear, enhanced oil recovery, oil shale, and combustion. The major effort is devoted to coal research and development, in which there are 13 separate agreements with 11 different nations, ranging from basic R&D in China and Japan to on-site clean coal technology work at a power plant in Poland. The second largest effort is in renewables, with six agreements with four countries and the EC supporting longer term research type programs, some of which have been underway for the better part of the past decade. The third largest effort is in environmental work, with four agreements with Japan, China, and Mexico that range from work in China related to atmospheric trace gas studies bearing on global warming, to a recently-initiated DOE-Mexican Petroleum Institute program on major options for improving air quality of the Mexico City Basin.

Another 16 agreements are divided roughly equally among the remaining six activities.

Helping to build market economies in eastern Europe warrants special mention. Those countries are depending heavily on reconstruction of their energy infrastructure. DOE participates in three umbrella agreements, managed by the Department of State, for S&T cooperation with Yugoslavia, Poland and Hungary.

DOE's collaborations with Yugoslavia, Hungary and Poland involve joint research and development projects between their research institutions and U.S. counterparts in fossil, renewable and nuclear energy, and basic energy sciences. The collaborations also fund exchanges of scientists, project development trips, seminars and workshops. Under the Support for East European Democracy Act of 1989 (SEED), DOE also signed an agreement on March 15, 1990 with the government of Poland to carry out two activities: a) retrofit of a coal-fired power plant in the Krakow region with advanced American clean coal technology for emissions control; and b) cooperation with Polish officials and experts and companies in the U.S. to assess and develop capability in Poland to manufacture or modify boilers, furnaces, or other equipment to use fossil fuels cleanly. Congress authorized $30 million for DOE over three years (FY-90-92) to carry out these activities.

ITER

The U.S. Government has conducted domestic research programs in controlled thermonuclear fusion for more than 33 years. There also are ongoing bilateral porgrams with Europe, Japan and the Soviet Union. These research programs have explored the basic physics and magnetic confinement methods for achieving a sustained fusion reaction. During FY-90, the U.S. continued to be engaged with Japan, Europe and the USSR in a detailed conceptual review stage of the International Thermonuclear Experimental Reactor (ITER) project. If the partners agree, the ITER project will move to the next phase, engineering design.

USAID Activities

USAID conducts a wide-ranging program of energy-related technical assistance, innovation and training in developing countries and, increasingly, in Eastern Europe. USAID's energy program seeks to expand the availability of clean, affordable and reliable electric power through promotion of energy efficiency, renewable energy, energy policy and planning, training, private power development, and capital support. In Poland, USAID, in conjunction with EPA, is funding an assessment and project prefeasibility study on harnessing more effectively for energy purposes Poland's abundant coalbed methane gas. In developing countries, USAID is supporting expansion of use of indigenous fuels, agricultural wastes (sugar cane, rice and wood wastes) and biomass residues for energy production. A major ten-year project (through 1994) in R&D and project development devoted to the use of biomass residues for electricity production is under way in several developing countries. Related work supported by USAID is evaluating the potential of steam-injected gas turbines to increase electricity output greatly at biomass-fueled power plants. USAID is also supporting work on more efficient and environmentally clean combined cycle technology for generating energy, in such countries as India, Egypt and Pakistan.

USAID is also collaborating with other agencies and donor organizations to support two energy efficiency centers, one in Poland and one in Brazil. Near-term projects being developed for the Polish center, largely funded by USAID and EPA, are likely to include creation of a computerized energy database for Poland and analyses of investment opportunities in selected industries. In Brazil, USAID is working with other donors to create a semi-private institute that will develop a range of programs promoting energy efficiency, with probable focus on the industrial sector.

USAID is also involved in a number of other energy-related activities, including supporting feasibility studies that can leverage greater private sector interest in and funding for given energy projects; encouraging developing countries to bolster their energy efficiency and conservation efforts; working with the U.S. Electric Power Research Institute and foreign electric utilities to explore formation of an international electric utility industry network to sponsor collaborative research and technology development (also relating to climate change); and providing training in several energy-related areas to foreign government officials and technical experts.

ECONOMIC COMPETITIVENESS

Introduction

S&T and economic competitiveness have become closely linked. U.S. economic success in the future will depend greatly upon ourability both to cooperate and to compete with foreign counterparts. The U.S. Technology Policy issued in September 1990 states that the Federal Government has a responsibility to:

- Encourage international cooperation in science and technology, where mutually beneficial; and
- Inform U.S. researchers of opportunities to participate in R&D initiatives outside the U.S.

The issues of intellectual property rights and comparable access, discussed in Chapter 1, also pertain to economic competitiveness. This section addresses other civilian areas exclusive of IPR and comparable access. The next section, on National Security, briefly discusses competitiveness aspects in the military area.

Information Collection and Dissemination

Timely access to topical information is crucial to competitiveness. In response to the 1986 Technology Transfer Act, Executive Order 12591 and the Japanese Technical Literature Act of 1987, the U.S. Government carries out a variety of activities concerned with collection, analysis and dissemination of foreign scientific and technical information. In supporting cooperative activities under bilateral S&T agreements with other countries, U.S. Government agencies also strive for reciprocal access to S&T information, as called for by the Trade and Competitiveness Act of 1988.

Making foreign research and development reports readily available to U.S. industry is a primary responsibility of the Commerce Department's National Technical Information Service (NTIS). In the past few years, more than 30 percent of the 65,000 information products added to the NTIS database collection came from international sources. Following the improvement in relations with the Soviet bloc, the Department of Commerce lifted embargoes on exchange of scientific and technical information which were imposed following the Soviet invasion of Afghanistan in 1980. Embargoes were lifted in 1990 for the USSR, Poland, Hungary and Czechoslovakia, which opened the way for negotiation of agreements to exchange and distribute scientific information with these nations. Discussions to this end have already begun with counterpart agencies in these countries.

As noted in Chapter 1, a project of the Departments of State and Commerce and the National Science Foundation, called STRIDE (Science and Technology Reporting and Information Dissemination Enhancement), provides U.S. researchers with information about foreign research activity. The "Foreign Technology Abstract Newsletter," published by the Commerce Department, has been expanded to include STRIDE information on commercial and technical activities obtained through U.S. Government offices abroad. The information is presented in a largely non-technical manner comprehensible to corporate managers who are not themselves scientists. Accordingly, information reported in the Newsletter helps U.S. managers to identify developments which may help them to compete more successfully in today's global economy.

The Department of Commerce maintains close contacts with U.S. industry to ascertain its needs for technical information. In line with industry's and congressional interest in increasing access to Japanese technical information, NTIS has produced a set of directories on

"Japanese Technical Resources in the U.S.", "Japanese Technical Reports in the NTIS Data Collection" (over 1500 listed), and "Japanese Databases Accessible from the U.S." Also, through a Task Force on Scientific and Technical Information under the U.S.-Japan Science and Technology Agreement, the U.S. is seeking formation of a Japanese Reprographic Rights Center (JRRC) to streamline copyright and translation rights clearance procedures. A JRRC would provide a central clearinghouse for these rights, increasing U.S. access to Japanese scientific and technical literature.

U.S. industry has expressed interest in obtaining translations of Japanese and other foreign technical reports. The U.S. Government is working on a long-range cooperative project to improve machine translations of various languages, including Japanese and Chinese. Additionally, under the auspices of the U.S.-Indo Subcommission on Science and Technology, work is being carried out with the Indian Scientific Documentation Center to use P.L. 480 funds to translate the latest state-of-the art reports from Japanese and other languages.

Japan is the leader in efforts to apply and commercialize Japanese-to-English machine translation technologies. In 1990, the House Subcommittee on Science, Research and Technology held a hearing to determine whether the U.S. Government should do more to promote research in machine translation technology. A Task Force on Scientific and Technical Information, chaired by the Commerce Department, has undertaken several projects under the 1988 U.S.-Japan Science and Technology Agreement to increase cooperation in machine translation (MT) research and development.

NSF and the Defense Advanced Research Projects Agency (DARPA) have contributed to these efforts. In 1990 the Government Printing Office, Library of Congress and NTIS exhibited at the Frankfurt Book Fair, the largest such event in the world attended by U.S. and international visitors, to demonstrate information sources available from the U.S. Government and to identify new foreign information sources. The U.S. Information Agency has participated in the Frankfurt Fair for years.

Information on U.S. technical competence relative to that of other nations is also available domestically through Defense Department and NASA-operated Information Analysis Centers (IACs). IACs are authorized to provide services to the private sector. Information can be obtained about the centers through the Defense Technical Information Center and NASA Scientific and Technical Information Facility.

Industrial Espionage; Information Systems Security

Another subject pertaining to competitiveness is industrial espionage. This affects competitiveness in two ways. First, "illegal" access to knowledge can give a competitor unfair advantage. Secondly, differing standards for information systems security could impair access by U.S. firms to markets.

In the area of computer security standards, during FY-90 the Departments of Commerce and Defense agreed to cooperate with the EC to devise non-discriminatory criteria and evaluation procedures. Recognizing the importance of security in all aspects of information and telecommunications technology, France, Germany, the Netherlands and the United Kingdom collaborated to develop a document entitled Information Technology Security Evaluation Criteria (ITSEC). A comparable document used in the United States, "Trusted Computer System Evaluation Criteria," was developed by the National Security Agency.

Many U.S. companies have developed products to meet the U.S. criteria, are interested in marketing these products overseas, and could be negatively affected by European requirements that are significantly different. The Department of Commerce and National Academy of Sciences are working with the EC to foster the development of harmonized international criteria for information security products. Some criteria have emerged from U.S. collaborative research with Canada, New Zealand, Australia and the United Kingdom on trusted computer systems. A new International Standards Organization (ISO) subcommittee on Security Techniques has been established to address generic information technology security needs. Planned activities include developing requirements for security techniques and mechanisms, and methods for evaluating security services. With the increasing volume of worldwide electronic data transmissions, uniform security standards are important to U.S. industry selling to foreign markets.

Chapter 2: ECONOMIC COMPETITIVENESS

Selected technology topics

Biotechnology

Less than two decades after the development of new biotechnologies (notably recombinant DNA and monoclonal antibody production technologies), U.S. industry shipped $2 billion of biotech-derived products in 1990. Recognizing that biotechnology promises to be one of the major growth industries of the 21st century and that Americans have invested billions of dollars in research and development, the U.S. has been actively seeking international cooperation to provide a favorable climate for innovation and to promote the responsible development of commercial biotechnology.

The U.S. is working in the Organization for Economic Cooperation and Development (OECD) with other industrialized countries, through the Committee on Science and Technology Policy's (CSTP) Group of National Experts on Biotechnology, to harmonize scientific principles for the safe use of genetically modified organisms. The Experts Group is completing two documents, "Good Developmental Practices" and "Good Industrial Large Scale Practices," recommending guidelines on using genetically modified organisms.

Several U.S. industry groups have been working with counterparts in Japan and Europe to improve international cooperation. In July 1990, the U.S.-Japan Business Council's Biotechnology Forum and a group of European companies, the Senior Advisory Group for Biotechnology, issued a report that outlines common principles for regulating biotechnology products in agriculture/foods and pharmaceuticals.

The U.S. has been cooperating with the European Community to minimize differences in approaches to regulating biotechnology and potential trade barriers, and to exchange information and experience on evaluating outdoor field trials of modified plants, micro-organisms and vaccines. The U.S. and EC also established a bilateral Task Force on Biotechnology Research in 1990 to improve cooperation and exchange information on the scientific aspects of biotechnology, facilitate collaboration in pre-competitive research areas, plan joint workshops, identify research needs in safety regulation, and exchange information and advice on regulations. The Task Force has identified several areas for possible future cooperation including genome mapping, research data bases and biosafety.

The U.S. industrial biotechnology sector will be affected by a series of directives being issued by the EC Commission in conjunction with creating the single European market in 1992. The U.S. is closely monitoring the single market program and is intervening with the EC in instances where draft directives contain provisions which could adversely affect U.S. commercial interests. Several draft directives would allow use of socio-economic needs tests in marketing authorization procedures for veterinary medicinals, agricultural productivity enhancers and transgenic animals. If enacted, such tests would lead to non- tariff trade barriers for new biotechnology-derived products. The U.S. has urged the EC to base decisions on scientific rather than economic or political factors.

In the GATT Uruguay Round the U.S. is seeking international agreements that would benefit biotechnology through improved patent protection, lower tariffs, a strengthened Government Procurement Code, measures to ensure non-use of invalid health and safety justifications to restrict agricultural product imports, improved dispute settlement procedures, and restrictions on use of trade-related investment criteria such as local content and export performance requirements.

The U.S. is seeking to increase access to Japanese government-supported R&D facilities for U.S. scientists and engineers under the aegis of the U.S.-Japan Agreement on Cooperation in Research and Development in Science and Technology. In April 1990 the Agreement's Liaison Group on Life Sciences met and agreed to pursue cooperation in two areas of biotechnology, bioprocessing and human genome research.

Advanced Materials

It is generally accepted in the U.S. and most other industrialized nations that the competitive success of future industrial development will depend significantly on the growth and application of advanced materials technology, among other technologies. The diversity of advanced materials applications is evident in a brief list of products: fiber and metal matrix composites, engineering plastics, powder metallurgy, advanced ceramic materials and high temperature superconductors.

An assessment of new diamond-thin films coating technology in Japan was undertaken in 1990 under the auspices of the U.S.-Japan S&T Agreement. The purpose of the study was to examine the level of scientific activity, progress in commercialization, and relative positions of the U.S. and Japan, as Japan is considered the world leader in the drive for commercialization of this technology. Diamond coatings, the hardest of all materials, have applications in the aerospace, automotive, computer, biomedical and machine tool industries. A recent report by the National Research Council stressed the importance of this technology, stating that its ultimate impact could outstrip that of high temperature superconductors. As part of the study, a delegation of experts from the U.S. visited Japanese companies, universities and government laboratories. They found that Japan leads the U.S. in all areas of diamond film technology except single crystal technology, where the U.S. and Japan are equal, and in theoretical modelling research, where the U.S. is ahead.

VAMAS, the Versailles Project on Advanced Materials and Standards, has programs in pre-standards research to accelerate development of internationally compatible standards for advanced materials. VAMAS recently commissioned a comprehensive progress review by an international panel. Strong collaboration between VAMAS and the American Society for the Testing of Materials will help ensure American participation in development of these standards, and with them, continued American access to international high technology markets.

The U.S. and EC have been meeting regularly under the bilateral High Technology Working Group and in other fora to discuss regulatory, patent and trade issues raised by EC directives which could have an impact on advanced materials. In the GATT, the U.S. is seeking international agreement to protect intellectual property rights for all technologies, including advanced materials.

Intelligent Manufacturing Systems

The capability of intelligent manufacturing rapidly to commercialize highly variable end products is no less significant than the introduction of mass production in the last century. Discussions on cooperation in advanced manufacturing under the U.S.- Japan Science and Technology Agreement took place in April 1990.

Under the U.S.-Japan Science and Technology Agreement, a U.S. Government interagency group was coordinated to develop a response to ideas for international cooperation in Intelligent Manufacturing Systems (IMS), originally proposed by Japan's Ministry of International Trade and Industry as a ten year research program. U.S., Japanese and European Community delegates participated in a trilateral meeting in Brussels. The Department of Commerce's Technology Administration, working with OSTP, DARPA, NSF, and other agencies, has coordinated the private sector response to IMS, holding nationally advertised workshops with industry and academia.

There also has been considerable activity in international standards setting in advanced manufacturing. More than twenty countries, including the U.S., are working jointly under the International Standards Organization to develop product data standards which will enable information about a product to be shared among different applications, such as design and manufacturing, and across various vendor products. In 1990, the EC published a report entitled "Directory of European Standardization Requirements for Advanced Manufacturing Technology and Program for the Development of Standards." Prepared by three major European standards setting bodies, the report has been formally accepted as the European benchmark in this area. The Europeans consider standards to be an international issue and circulated the document world-wide, raising questions for the U.S. standards community to address.

NATIONAL SECURITY

Overview

S&T developments bear, of course, on America's technological military edge. The Defense Department and U.S. military services intend to continue to conduct strong S&T activities, in conjunction with universities and firms, in areas germane to actual or potential military applications. Science and Technology also bear on our national security capabilities, in a general sense, as they impact upon our nations' economic competitiveness and growth.

International cooperation in militarily-related research and development is a challenging area of U.S. science and technology policy. The U.S. has usually benefited from technology transfer with allies. However, U.S. interests in maintaining a technological lead in the defense area, concerns about transfers of technologies, including those from allies, to certain third world nations, and competitiveness considerations can argue for prudence toward military S&T cooperation with foreign partners.

Chapter 2: NATIONAL SECURITY

Aspects of Defense Cooperation

Defense-related S&T collaborations pertain both to military production and to spinoffs. In military coproduction or codevelopment programs, collaborative teams of engineers and managers generate technologies which may be further exploited by each partner. Examples include the FSX project with Japan and avionics projects with France. The FSX project has produced materials technologies which benefit U.S. industries as well as design technologies benefiting those of Japan. Avionics projects with France produce standardized components for use in aircraft used by NATO allies.

The role of spinoffs is crucial to competitiveness, as in the information industries. However, differing corporate cultures affect the degree and rate with which effects of collaboration in military areas spin off into the larger economy. For example, some foreign defense contractors put a smaller percentage of their total activities into work in the defense area than do some U.S. defense contractors.

Chapter 3

Country Narratives

Argentina

The status of S&T in Argentina during FY-90 was in flux, affected by continued economic crisis and ongoing reviews of principles and aims, coupled with Argentine indecision and lack of necessary funding. FY 1991 should see change, provided the economic situation improves and if the hemispheric and regional integration envisioned by administration of President Menem bears fruit.

An economy in difficult stagflation and major government efforts to reduce deficit spending forced S&T development in Argentina to a near stand-still during FY-90. Political and public Argentine circles realize that S&T is important for confronting and overcoming future challenges, but corresponding public or private sector financial commitments were not forthcoming. Nonetheless, there is a near-national consensus that Argentina must change its traditional S&T aims and explore innovative means for achieving those aims.

The Menem administration's market orientation and its commitment to bringing Argentina into the first-world fold have led to analogous shifts in both public and private S&T, with renewed attention to applications-oriented research, engineering and technology. Lack of funding has obliged the Argentines to move from traditional nationalism toward greater S&T internationalism, as a source of both funds and work. The formerly interventionist state has revamped its role towards becoming a matchmaker between scientists/engineers and private industry, public schools and private industry; and foreign scientific/engineering and financial centers and the Argentine scientific/engineering community as a whole.

Basic Sciences

Argentina's forte in the basic sciences has been excellent theoretical training and the government's tradition of funding scientists' advanced study abroad. Theoretical scientific knowledge in Argentina is at first-world levels, but lack of concerted efforts to provide equipment and sufficient salaries, among other factors, has led to an emigration of highly trained scientists. Stemming the brain-drain has become a national priority.

The Argentine government and private scientific communities are working on means for drafting coordinated, comprehensive plans for private sector participation in all areas of basic research, from biogenetic R&D to advanced ceramics and other specialized materials research. Under auspices of the executive and legislative branches individual universities, state institutes and private scientists have exerted efforts to draw out industrial support and interest as well as help from foreign public and private resources. Local, provincial, and national congresses have been held or are in the offing. Most of the effort is still in the priorities-identification and planning stages.

Health

Argentina has a small population for its territorial size (about 28 people per square mile), especially compared to its food production capabilities. By and large the population is healthy, though pockets of deprivation exist and have grown since the economic downturn of 1989. AIDS is of increasing concern but national statistics are not reliably collected or analyzed. Official current estimates show about 650 confirmed cases of AIDS and approximately 20-40,000 HIV infected carriers of the disease. A much greater problem has been Chagas disease. Current government statistics show nearly one tenth of the 33 million population are affected by this disease, with 600,000 people suffering irreparable and incapacitating damage. This creates a significant drain on resources, but also hampers real or potential productivity of a tenth of the population. Any future increase in AIDS (or any other disease) incidence in Argentina could severely tax currently strained health services. Recognizing this, the government is actively pursuing international joint research efforts to counter future problems and try to deal with Chagas disease.

Environment

Argentina's focus on seeking international financial support for science has heightened its awareness of developments overseas. Community leaders cited President Bush's Debt-for-Nature and Enterprise for the Americas initiatives as precipitating an avalanche of ideas for possible joint ventures in environmental or development areas inside

Argentina. The Argentine response for input on the global change regional research institute was impressive: two wide-ranging executive branch efforts to coordinate a comprehensive S&T response and a scheduled legislative branch congress.

Argentina's formerly fragmented and weak environmental lobby has been bolstered by the government's pointing to the environmental/climate change areas as a means of gaining long-term S&T development financing. Government refocusing has resulted in an unexpected by-product, the realization that environmental research is imperative for managing effects of precipitation patterns, resource use and allocation, technology development, air/land/water pollution, desertification, reforestation, and ozone/radiation fluctuations (the latter the subject of bilateral CONICET-NSF project in Ushuaia), among other areas.

Energy

Argentina's energy resources, priorities and resulting policies are a continuing mixture of competing interests, which have led to some independent S&T development in the nuclear field. Argentina has two nuclear power plants (Embalse and Atucha I), and a third under construction (Atucha II). Argentina is currently self-sufficient in oil, and recent privatization of secondary field exploitation should ensure continued supplies for internal demand or increased export. This may skew near-term investment priorities toward traditional thermal energy production to meet expected increases in industrial demand. But environmental considerations and daunting internal energy transmission/transportation difficulties will ensure continued nuclear and some limited hydroelectric investments.

Needs and funding availability may lead to reactivation of perennial development ideas for the "CAREM" small-scale, nuclear power plant, a plant designed but never built for energy production in isolated rural areas. The national atomic energy commission, CNEA, is currently exploring the possibility of foreign investment for CAREM development. With a focus on environmental concerns, however, Argentina could also, with outside assistance, consider wind and solar as alternative energy developments.

Economic Competitiveness

Much of the Argentine rationale for shifting from nationalism to internationalism derives from growing public and private realization that Argentine technological competitiveness lags much behind the excellence of its educational S&T training. Much technological development in the last two decades was based on imported technology, which was built little further after importation. There is almost no domestic industry involvement in or support of R&D or S&T applications in Argentina. An exception is indigenously-developed nuclear research reactor technology, which Argentina has exported, though under limited conditions of competition. Past investments in heavy water, uranium enrichment and fuel reprocessing technologies were aimed at developing nuclear competitiveness, but have yet to be realized due to lack of funds.

To counter applications "backwardness," the S&T community is using the congresses mentioned above to identify priority areas for concentrated allocation of the state's limited public funds while attracting private industry investments. This internal approach complements Menem administration policies to promote economic (including S&T) integration between Argentina, Brazil, Chile, and Uruguay. An example of regional cooperation to come is the Argentine- Brazilian CBA-123 aircraft R&D project, which recently launched a medium-sized jet for export markets.

National Security

The GOA's perception of S&T advance as a means for regaining socio-economic development and insuring continued growth of democracy in Argentina is an integral part of Argentine national security aims. This perception holds also that national security requires Argentina to become part of the developed (western) world. Both requirements in turn require adopting those policies which have made the developed nations successful. The Menem administration has therefore shown a disposition for restructuring the economy along open market lines, buttressed by possible reforms in intellectual property rights. It has also actively investigated debt-for-science (meaning debt-for-development/technology) financing to expand potential avenues of development.

The Menem administration has also moved toward revising Argentine opposition to adherence to the Treaty of Tlatelolco, thus joining with the nuclear, non-proliferation countries, and redirecting Condor II missile development into peaceful, civilian space technology activities. In much the same spirit Argentina cancelled the Condor missile program.

Brazil

Brazil is the fifth largest country in the world in land and, with 150 million people, sixth largest in population. It is the largest country by far in South America and the acknowledged leader in promoting South American integration in economic and other areas, including science and technology. Brazil has the largest number of trained scientists and technicians in the region, over 500 research institutes and over 100 organizations involved in S&T policy-related activities. Most of the S&T talent and facilities are in the states of Rio de Janeiro and Sao Paulo, but other states, notably Rio Grande Do Sul and Minas Gerais, are beginning to carve out niches.

There are numerous professional science organizations in Brazil, the most prominent being the Brazilian Society for the Promotion of Science (comparable to the AAAS), which attracts over 5,000 participants for its annual meetings. There are several scientific journals, as well as a well-produced magazine for laymen called Ciencia Hoje (Science Today). The GOB spent 0.6 percent of 1989 GNP on S&T and supported about 70 percent of R&D done in the country. However, major financial measures to put the economic plan of recently-inaugurated President Collor into effect took a heavy toll on the science sector. Nonetheless, a new program was designed which foresees heavier future government S&T investment along with encouragement of increased investment by industry. For example, FINEP, the GOB funding program for studies and projects) had its budget nearly quintupled, from $60 million in 1990 to $292 million in 1991, and will devote 70 percent of the new funds to technology, where it has traditionally only invested 10 percent.

The U.S. has had a formal S&T agreement with Brazil since 1971. In 1986 Presidents Reagan and Sarney signed a Science and Technology Initiative (STI) to expand this cooperation in six broad areas: biomedical science, oceanography and meteorology, basic science, agriculture and ecology, alternative energy sources, and engineering and new materials. Project work began in earnest in FY-90. Financed by the STI, some of the numerous projects and visits have led to preliminary agreements to continue cooperation with funds from participating agencies during the next year. In addition, a formal agreement was signed for cooperation between the Defense Mapping Agency and the Brazilian Institute for geography and statistics for a satellite tracking station.

Basic Sciences

Brazil has a solid foundation in the basic sciences, the focus of the traditional university program and the area in which a high percentage of scholarships for study abroad are given. One example of such excellence is the Brazilian mathematician Jacob Paulis, who received the annual prize of the Third World Academy of Science for his work on chaos. However, funding problems for salaries and equipment have caused a reduction in programs and drop in morale over the past three years, with some exodus to the private sector. The pronounced shift of emphasis of the Brazilian government toward technology will probably reinforce this trend, in spite of a slight increase in funding for basic sciences above that of FY-90.

Brazilian cooperation with U.S. institutions has traditionally been in the basic sciences. Among the most long-lasting has been that between NSF and CNPQ (National Research Council). A subsidiary of that cooperation, the program in high energy physics between Fermilab and the National Physics Laboratory, is regarded as especially beneficial to the two partners.

Health

Brazil's tropical location and its strong group of biological scientists has made it important for research in tropical diseases such as malaria, leishmaniosis, chagas, and schistosomiasis. Brazilian scientists participated in a breakthrough this year in simplifying the diagnosis of Chagas disease. The fact that Brazil has the second-largest number of reported AIDS cases has spurred research in that area. However, many Ministry of Health resources have had to focus on more basic problems, such as a medical-care system beset by illness from malnourishment (60 percent of the population is considered malnourished), and lack of vaccination against common childhood diseases. The best research institutes in the country therefore receive more resources to develop vaccine production facilities than for continuing research. Indeed, these institutes are soliciting a variety of international partners, including NIH and various universities in the United States, to broaden cooperation in basic research in order to maintain work in this sector.

Environment and Global Change

Brazil has 30 percent of the world's tropical forests and the world's largest wetlands. The Amazon River basin, most of which lies within Brazilian borders, has 18 percent of the world's fresh surface water supply. Brazil has more species of primates, spiders, amphibians, flowering plants, and psittacine birds (such as parrots and macaws) than any other country. In numbers, it has more terrestrial vertebrate animals. It is therefore critical in global concerns about climate change, deforestation and biodiversity.

Brazil is now among the front-runners in urging environmental protection and action, a turnaround from the poor image it recently had as "destroyer of the Amazon." Brazil's Secretary for Environment, a cabinet-level official, is an internationally-known ecologist who sets the broad parameters for environmental policy within the Brazilian government and also acts as Brazil's Ambassador-at-large for Environment to the world. He is supported by an already-existing solid body of domestic environmental law, including a chapter in the constitution, a forestry code, fauna protection law, fish code and national plan of coastal management which the Brazilian Institute for Environment and Renewable Natural Resources (IBAMA) is seriously beginning to enforce. For example, burning in the country has been reduced by 50% in two years. The government is also beginning to examine what it can do about extensive uncontrolled mining which has caused damage to forests and mercury contamination of waterways, and been a factor in the spread of malaria.

Major problems remain, including too little money and too few trained personnel to implement existing laws fully. The nation's 100 million very poor eke out a living in whatever way they can, regardless of environmental considerations. A primary focus of the government is to improve their standard of living.

Chapter 3: Brazil

There is now a high degree of environmental consciousness among the middle and upper classes throughout the country, reflected by an exploding number (over 1,000) of NGO's dedicated to environmental protection.

Internationally, Brazil has ratified the Montreal Protocol on protection of the ozone layer and has been an active participant in fora such as the IPCC (Intergovernmental Panel on Climate Change), where it has lobbied for transfer of funds and technology to third world countries to implement environmental protection and climate change measures. It is participating actively in the CEOS (Committee on Earth Observation Satellites) program for satellite monitoring of earth's resources. Brazil chairs the CEOS group on monitoring the world's forests. Brazil will host the 1992 United Nations Conference on Environment and Development (UNCED).

EPA has had a small program with CETESB, the Sao Paulo Environmental Monitoring Agency, for five years. This year it negotiated a Memorandum of Understanding with the Secretariat of Environment and IBAMA for cooperation at the federal level. It also, under UN auspices, ran a cooperative program with Brazil to study implementation of the Montreal Protocol. The U.S. Forest Service has conducted exploratory talks for cooperation in forest and fire management programs. USAID is implementing a small program in the Amazon region on sustainable forest use as part of its global climate change initiative. NASA and NOAA have both carried out atmospheric science projects with INPE (National Institute of Space Research) to study effects of burning (smoke plume and troposphere) and climatological phenomena which could be related to climate change. In addition, the GOB has shown interest in hosting the regional Global Change Institute proposed at the April White House Conference on the Science and Economics of Climate Change .

Energy

At the time of the first oil price shock in 1973, Brazil took a number of innovative policy decisions which the 1978 oil price shock saw broadened. These included exploration of national oil reserves, development of ethanol-fueled cars and support of an autonomous nuclear energy program along with a nuclear program carried out jointly with West Germany. Brazil is today an exporter of gasoline and has four million cars fueled by ethanol. The sugar-cane based ethanol has not been economically competitive with gasoline and the program was in serious trouble before the 1990 Gulf crisis. Measures to attempt to make ethanol an economically viable alternative are now under study.

Hydropower is the main source of electric energy. Some of the world's largest hydroelectric dams are in Brazil and, until two years ago, plans for the future included several more in the Amazon region. These projects are now being reexamined in light of environmental concerns and technical problems with initial projects which resulted in low production at high cost. Environmental concerns are also slowing development of thermal plants dependent on Brazilian coal, which has a high ash content, and are playing a significant role in the development of charcoal-fueled industries. IBAMA is strictly enforcing forestation programs which are required of all such plants, thus making this truly a renewable source of energy. The enforcement is creating a temporary slowdown because many of these industries relied heavily on virgin forests.

The nuclear program has had little success as an energy source. Only one power plant is in operation. Another is ninety percent complete, but at enormous financial cost. The autonomous program has attempted to master the fuel cycle and develop a critical unit reactor. Concerns over this program were eased by President Collor's order to fill in the Cachimbo test shaft in May, by his renunciation of nuclear explosions at the UNGA in September, and by various statements by other GOB personnel culminating in President Collor's announcement that Brazil would seek an IAEA safeguards program.

Current emphasis is on energy conservation. Measures such as more realistic pricing for energy are being implemented and industry is being urged to develop more energy-efficient products, a ripe area for technological innovation.

Economic Competitiveness

Brazilian industry had protection from import competition until this year and traditionally invested little in R&D. Consequently, its technology is largely behind the world market. The sudden opening of most imports except key informatics is forcing reorientation. To help industry make the transition, the GOB is augmenting its research funding and is directing 70 percent to the industrial sector. It is also revising its industrial property code to provide increased intellectual property rights protection, as current protection is inadequate to encourage technology transfer, especially in pharmaceuticals and fine chemicals. A draft bill is scheduled for presentation to Congress in March 1991.

S&T officials say that competitive success depends first on the government's ability to maintain economic stability and second on Brazil's finding market niches. It is not yet clear how competitive Brazil will be, but strong sectors include biotechnology (especially in agriculture), metals and metallurgy, and informatics.

National Security

Brazil has developed a significant arms industry for sales abroad. It does not have export controls comparable to COCOM, and sales to some Middle Eastern and Mediterranean countries have been of concern.

Brazil's unsafeguarded nuclear program and its rocket/missile development program heighten this concern. For this reason, there has been limited bilateral cooperation with the United States in nuclear energy for many years, and restrictions on cooperation on Brazil's rocket/missile program (including the satellite launch vehicle) have been maintained since the 1980's (now formalized under the missile technology control regime).

The Collor government has taken steps to make the nuclear program more transparent and to institute strict domestic controls. There have been indications Brazil is considering responses to international concerns as well. The combination of the Persian Gulf crisis and opening of the program to public knowledge has led the Ministry of External Relations to indicate it is now considering the need for controls on sensitive technology and on the ability of persons who have worked on government programs in this area to contract to other governments.

Canada

The United States and Canada maintain a broad and active science and technology relationship. There is close cooperation between Canadian and American governmental and academic institutions and between industrial R&D programs. U.S. public and private research institutes as well as individual researchers enjoy broad access to public research facilities and private facilities receiving public support.

Basic Sciences

The lead Canadian government office for S&T policy is Industry, Science and Technology Canada (ISTC). ISTC has established general policy goals in an effort to guide Canada's transition into a new set of technologies which began to emerge in the 1980's. These include helping industry build capabilities in technology critical for competitiveness, providing better focus for domestic S&T resources, developing a government/industry/university consensus on strategies, and redesigning or at least rethinking Canada's international S&T relationships.

Canada is finalizing a science and technology action plan between the federal and provincial governments in Ontario and Manitoba, however, the plan has been delayed as newly-elected governments review their positions before signing on.

One of the largest proposed science projects in Canada is the Kaon-Triumf Particle Accelerator in British Columbia, estimated to cost about 708 million Canadian dollars. British Columbia's government has pledged to provide C$236 million over a six-year period. Several countries have also offered support for the project. As of late 1990, however, the Big Science Committee of the Prime Minister's National Advisory Board on S&T had not reached a decision on whether the federal government would provide funding. Research at the Sudbury Neutrino Observatory involves cooperation with DOE.

The Canadian space program includes three main areas of activities: Development of a Mobile Servicing System (MSS) for the Space Station Freedom program, design and construction of an advanced remote sensing satellite known as Radarsat, and design and construction of a new mobile telecommunications satellite (MSAT). In addition, the Canadian space program supports work on space science including space physics, upper atmosphere research, space astronomy and microgravity science. Canada also has an astronaut program, with six astronauts, one of whom is scheduled to fly on a U.S. shuttle mission in 1991.

Health

The Canadian government fosters and supports public health research and related scientific activities through the National Health Research and Development program, which compliments programs of the Department of National Health and Welfare. The Department's Medical Research Council (MRC) administers medical research programs through grants-in-aid of operating and equipment requirements for research projects, direct support for a limited number of investigators and research trainees, incentives for the development of research in productive fields where contributions are expected and in areas where research has not been adequately developed, and support for joint private sector/university research efforts. The estimated 1990-91 level of transfer payments for research-oriented grants and scholarships totals C$215.9 million, up from the 1989-90 level of C$ 89.1 million.

The United States and Canada have historically maintained a strong collaboration in the health field without the need for formal agreements. Informal cooperation is carried out in the following four areas: disease prevention, health promotion, health statistics and joint research. Specific ongoing agreements do exist in regulatory areas with the Food and Drug adminstration, and medical information sharing with the National Library of Medicine Medlars system at the National Institutes of Health.

Environment

Fiscal Year 1990 was a landmark year in addressing the major environmental issue between the U.S. and Canada, acid rain. Passage of the U.S. Clean Air Act, with its strong provisions for dealing with acid rain, was warmly welcomed in Canada. Negotiations on a bilateral air quality agreement were also initiated during the year, and significant progress was made toward a joint text. The U.S. and Canada continued to cooperate closely on a number of other environmental issues of common concern. EPA and Environment Canada agreed in 1990 jointly to draft a Great Lakes Pollution Prevention Plan. Work continues on the plan. The U.S. and Canada also began consultations on Great Lakes zebra mussel problems and agreed to exchange information on research on this fast spreading nuisance.

During 1990, Canada made major progress in developing its own national environmental strategy. On March 29, the GOC released "A Framework for Discussion on the Environment" to promote public dialogue on the Canadian Green Plan. As its objective, the government said it would "make Canada, by the year 2000, the industrial world's most environmentally friendly country." In August, the government released a report on its public consultations on the Green Plan. The final plan was expected to be completed and released by the end of the year.

Energy

Canada and the U.S. work closely on energy-related issues. The Canadians proposed the establishment of regular consultations between DOE and EMR to discuss issues such as energy efficiency and alternative energy. U.S.-Canada cooperative projects have included gas hydrates, coal heavy oil co-processing, high power lasers, alternative transportation fuels, solar technologies and other fields. DOE is also working closely with Atomic Energy of Canada Ltd. (AECL) on fusion energy research and higher energy nuclear waste management.

Economic competitiveness

Like many countries, Canada has begun to devote attention to the question of national economic competitiveness. Canadian policymakers believe Canada faces two specific competitive burdens: a small economy in absolute size, and domination of many sectors of that economy by foreign firms which tend to keep R&D efforts centralized in their home countries. An official Canadian response to competitiveness issues was a 1989 "Report of the Advisory Council on Adjustment." This report recognized inadequacies of current Canadian R&D efforts but, rather than propose a new emphasis on innovation, suggested that Canadian firms would be better served by efforts to acquire and adapt the results of innovative research elsewhere.

Canada recognizes that competitiveness is more than just R&D, and that improving Canada's competitiveness will also require significant and difficult adjustments to the rest of the economy. For example, Canadians are concerned whether schools are adequately preparing both scientific personnel and workers for the 21st century. Conference Board of Canada surveys in 1990 reported that employee illiteracy is a problem for 70% of firms surveyed, and that 23% of technology-intensive firms have difficulties hiring skilled R&D personnel.

National Security

The federal government spent just under C$300 million on defense-related R&D in 1989/90. Defense ranks seventh in comparison with federal expenditures on other sectors of R&D: social development, agriculture, forestry and fishing, advancement of knowledge and research training, earth and atmosphere, industrial development, and health.

The Canadian defense industry is much smaller and less diversified than its U.S. counterpart. Canadian companies, however, have developed technology and expertise in a number of areas important for joint defense needs, including military radios, navigation systems, short takeoff and landing (STOL) aircraft, reconnaissance drones, anti-submarine warfare systems, flight simulators, remote sensing, ballistic computers, and equipment suited for use in Arctic conditions. The U.S. and Canada have a close defense relationship which extends to joint development of defense technology. Under the 1963 Defense Development Sharing Program, some projects in Canada are funded jointly by the two countries. Examples include the AN/GRC-103 tactical radio by Canadian Marconi, and the Indal Technologies RAST system for landing helicopters on destroyers and frigates. SPAR Aerospace Ltd., a Toronto company, is the prime contractor for developing an infrared search and target designation system for the U.S. Navy and the Canadian Department of National Defense.

China

In the wake of the trauma of summer 1989, the Chinese government cautioned intellectuals against western political influences and curtailed exchanges of scholars. However, natural scientists were praised for their contributions to a strong independent China, and continued scientific cooperation was encouraged with foreign countries, including the U.S. Chinese scientists have made abundantly clear the importance they attach to maintaining relationships with U.S. and world science.

The dominant theme of science and technology policy in China during FY-90 became even more a push to strengthen China's economy with modern science and technological advances. Under economic retrenchment, funding for scientific research was tight but available, especially for applied research on pressing problems. Priorities listed by science policy makers included agricultural research, development of high-tech industry and technological enhancement of traditional industries.

Basic Science

Although the need for applied technology is often stressed, China's science policy makers have also pointed out that without strong basic research, China would not have had the scientific foundation for technological achievements such as nuclear energy and rocket launching. To improve the quality of basic research in China, current policy is to strengthen China's recently developed competitive funding systems. China's science leaders are especially pleased with current basic research in high energy physics and high-temperature superconductors. The successful operation of Beijing's electron-positron collider for one year is seen as a demonstration of China's ability to conduct world-class basic research.

Although Chinese policy makers value independent achievement, they also support cooperation with foreign scientists in basic research. For example, several Chinese scientists will be working on the superconducting supercollider in the U.S. Cooperation under the US-PRC Protocol on Basic Sciences has, however, slowed somewhat since summer 1989, partly due to program delays and slower communications. Some projects have recently gone forward, for example in zoology, and the Chinese Academy of Sciences and its subordinate institutions have been very supportive of continued cooperation.

Chapter 3: China

Health

The US-PRC Protocol on Medicine and Public Health is broad-based and multi-disciplinary, with many U.S. and Chinese institutions cooperating. Joint research includes a wide range of topics, with cardiovascular research, oncology, and epidemiology among the more active areas in FY-90. The Chinese are very active in medical research. As the standard of living improves, research has moved from concentration on common infectious diseases such as influenza and primary care to a focus on long-term chronic illness, cardiovascular disease, and cancer. AIDS has yet to become a major problem in China. Only a handful of cases have been discovered in the general population. However, during the past year nearly two hundred cases were discovered concentrated in an intravenous drug abusing community near the Chinese border with Burma. Chinese health officials are quite concerned about the potential threat of AIDS and are working with WHO to devise a comprehensive AIDS-prevention strategy for China. The Chinese public health community also is paying renewed attention to schistosomiasis, which was believed under control in the 1950's but recently has been increasing rapidly in southern China's paddy fields.

Environment

China was especially active in FY-90 on environmental issues on both international and domestic fronts. Chinese policymakers and technical experts made significant contributions to international activities on the environment, both inter-governmental (e.g. Intergovernmental Panel on Climate Change, IPCC) and non-governmental (e.g. IGBP). China joined the Basel Convention on the Transport of Hazardous Wastes, and Chinese officials called for China to join the Montreal Protocol on Ozone in the near future. On wildlife protection, China opposed the majority of international opinion by entering a reservation to the Convention on International Trade in Endangered Species (CITES) trade ban on African elephant ivory.

On the domestic front, the Chinese held a series of academic and governmental meetings on environmental issues, including international workshops on environmental strategies in China and national meetings of environmental officials on the implementation of environmental policy. The National Environmental Protection Agency (NEPA) continues to push for a more complete body of legislation on the environment. China enacted a revised, strengthened law on environmental protection and a new law on marine dumping. Strengthening the emissions licensing system is also a priority for NEPA, as enforcement of pollution controls continues to be a challenge. With desertification, ground water depletion, untreated wastewater and related problems on the rise, better water management is also a top priority. Deforestation and the resulting soil erosion and loss of wildlife habitat are also major problems.

The Chinese are placing a high priority on environmental research. Some of the current projects include research on red tides and marine pollution, upgrading environmental monitoring stations, and research on endangered species. The U.S. is involved in cooperative research with China on the environment and global change under several protocols. The US-PRC Protocol on Environmental Protection Research is very active. Recent projects include research on coal smoke and lung cancer, CFC alternatives in refrigeration, methane monitoring, and aerosol research. The two countries are also engaged in cooperative research on acid precipitation. The US-PRC Protocol on Marine and Fishery Science concentrates on climate research in the Pacific ocean.

A U.S.-PRC Protocol on Atmospheric Science has several projects which relate to climate change. The U.S. and China are engaged in research on historical climate change under the Fossil Energy Protocol as well as under the Basic Sciences Protocol. The Protocol on Nature Conservation includes research on several endangered species and on nature reserves. Several other protocols, such as cartography, agriculture, surface water hydrology, and transportation include projects which directly or indirectly relate to environmental issues.

Energy

The development of adequate energy resources is of critical importance to the achievement of Deng Xiaoping's goal of bringing China to the level of "developed nation" by the year 2000. Chinese policy planners acknowledge that there is no easy way to balance the conflicting needs of development of energy and transportation resources and protection of the environment. Increasing awareness of the damage wrought on the environment in China by the burning of high sulfur/high ash coal is leading slowly to more reliance on nuclear energy. Senior officials including Premier Li Peng publicly have stated that the development of nuclear energy is a high priority for China. In this context, increased cooperation with the U.S. on nuclear safety is very desirable to the Chinese. Many of their nuclear safety laws are verbatim translations of U.S. Nuclear Regulatory Commission regulations. The PRC National Nuclear Safety Administration (NNSA) regularly sends researchers to the U.S. and maintains a close cooperative relationship with the USG.

The Chinese government is participating in research programs designed to enhance the efficiency of coal mining and burning as well as mine safety. PRC government officials value these programs very highly, and have repeatedly pointed out that anything that helps them clean up their environment will have a positive effect on worldwide environmental quality. Chinese energy researchers are also very interested in American advances in alternative energy. The Chinese have developed a number of solar energy systems on their own which are now widely used in some rural areas. In Xinjiang province and Inner Mongolia the Chinese are working on exploiting wind energy for the production of electricity.

Economic Competitiveness

With U.S. encouragement, the PRC enacted its first copyright law in September, 1990. While the legislation fell short of standards the U.S. would prefer, the National People's Congress accepted not only the principle of copyright but included copyright of computer software, a step important to the U.S. industry. The new law and its implementing regulations are to be promulgated June 1, 1991.

Bilateral discussions continued on an intellectual property rights annex to the US-PRC S&T Agreement, as stipulated by the Omnibus Trade Act of 1988, but progress was slow. Without agreement on an intellectual property rights annex, the US-PRC S&T Agreement continued to operate on a series of short-term, temporary extensions dating from the beginning of 1989, but is due to expire April 30, 1991. Many of the protocols under the S&T agreement have also continued on the basis of temporary extensions coterminous with the main agreement. The absence of a five-year renewal of the S&T agreement and its subsidiary protocols has hindered scientific cooperation, as both sides experienced difficulties in planning and budgeting for new projects. This problem became more evident during FY-90 as previous work plans under some protocols were completed and cooperating agencies initiated discussions on new projects.

National Security

Relaxation of tensions on China's borders and the continued push for economic development may mean reorientation away from old military technologies toward more advanced and high-tech activities, as well as a shift in emphasis from individual projects to more general research and development. An important goal of reform in the Chinese science and technology system has been to convert military enterprises to civilian purposes. The Chinese hope to utilize some of their military manufacturing capability to produce consumer electronics, and to use resulting profits to support Deng's four modernizations. Many factories that used to manufacture military communications equipment have switched to producing radios, stereos, TVs, motorcycles and household appliances for the domestic market and for export. A program known as the "863 Plan" promotes allowing formerly restricted technologies to be used for civilian purposes.

The successful launch of an American satellite on a Chinese Long March rocket was perhaps the best example of the conversion of a military product to civilian uses. The satellite is being used by a communications company to beam television signals to some twenty-two Asian countries.

Czechoslovakia

Basic Science

In the past Czechoslovak scientists have suffered from being isolated but nevertheless maintained relatively high standards. Now, although political barriers have been removed, lack of hard currency remains an obstacle to study and travel abroad.

Health

Health sciences have problems similar to those of basic sciences. Czechoslovak doctors are well-trained but lack access to foreign medical publications and modern equipment and medicines.

Environment

Public opinion polls have repeatedly shown ecology to be at or near the top of public concerns. All political parties made the environment a major theme of the recent elections. The creation of environmental ministries at the federal and republic levels shows the government's concern and desire to move quickly.

Energy

Czechoslovakia consumes many times the amount of energy used in western countries to produce an equivalent amount of GNP. It is almost completely dependent on the Soviet Union for oil and gas. In the past it was able to pay for this oil and gas in soft currency (transferable rubles) at non-market prices. In 1990, it will have to pay for some, and next year all, energy imports in hard currency at market prices (though Czechoslovakia will be able to cover some of this cost by swapping its ruble trade surplus with the Soviets for oil, at an exchange rate yet to be determined). The rise in oil prices due to the Gulf crisis complicated Czechoslovak economic reforms. Expansion of coal as an energy source could be environmentally damaging. Czechoslovakia welcomes information on energy conservation and alternative energy sources.

Economic Competitiveness

All the above areas provide commercial opportunities for U.S. companies. U.S. firms like Upjohn and Hewlett-Packard were quietly successful in the Czechoslovak market even before the revolution. In 1989, the U.S. Embassy sponsored a well-attended medical equipment catalog show. U.S. companies are beginning to make inroads in the environmental area. The Embassy commercial section plans three environmental trade events in 1990-91, one of them in conjunction with a USIA-sponsored exhibition. At least two American companies have donated equipment to Czechoslovak universities and technical schools. Such donations not only yield immediate good publicity and contacts, but promise future benefits as students trained on U.S. equipment move into Czechoslovak industry.

National Security

Czechoslovakia's moving closer to the West may ease prospects for international cooperation in areas formerly circumscribed by U.S. national security concerns, and such cooperation would be one way to reinforce democracy in Czechoslovakia. Information technology is important to the development of democratic institutions and a modern market economy. The GOC has made modernization of its telephone system a priority and has expressed an interest in information on spectrum management in radio and television.

European Community

As noted in Chapter 2, U.S. S&T interaction with Western Europe predominantly occurs bilaterally with individual countries, and the U.S. continues to attach the highest importance to those relationships.

Basic Science

In early 1990, EC and U.S. science policy officials began informal discussions, coordinated on the U.S. side by the OSTP-chaired Federal Coordinating Council for Science, Engineering and Technology (FCCSET), to identify possible cooperative opportunities. Assistant to the President for Science and Technology, Dr. D. Allan Bromley, and EC Commission Vice President Filippo Pandolfi, agreed to establish a U.S.-EC Joint Consultative Group on Science and Technology, to be co-chair by Bromley and Pandolfi.

The Consultative Group is envisaged as an informal forum for discussion on science and technology issues, enhancing information exchange and facilitating cooperation, with the goal of increasing mutual understanding of U.S. and EC activities in programs relating to S&T. The Group may develop policy recommendations on appropriate, mutually beneficial cooperative research programs, including programs in basic research. At the same time, the U.S. has made clear in our ongoing discussions that we continue to attach the highest importance to our bilateral S&T cooperation with the individual Western European nations.

Another outcome of U.S.-EC discussions was the establishment in September 1990 of a U.S.-EC Task Force on Biotechnology, to increase mutual understanding of U.S. and EC activities and programs in this field. The Task Force held its first meeting in Washington on September 10-11, 1990, with Assistant Secretary of Agriculture, Dr. Charles Hess, and one of the EC Commission's Directors General, Dr. Paolo Fasella, as co-chairpersons.

The European Community for many years has been involved in applied research, initially in the nuclear area and in support of mature European industries, and in a more limited way in the basic research area. As the EC intensifies its efforts toward a unified European market by the end of 1992, it is expanding its support for cooperative S&T research by investigators in two or more member countries. The EC currently supports such research primarily through two programs: Framework, a collection of research and technological development activities; and ESPRIT (European Strategic Program for Research and Development in Information Technology). It should be noted that the current budget of these programs is only about four percent of the aggregated civil R&D budgets of the 12 member states. The programs, however, have potential to leverage substantial additional public and private sector funds. Most projects being supported are in the so-called precompetitive research area. However, there is a decided sentiment in the EC for more substantial basic research support.

Significant EC-related science policy issues for the United States over the medium term are likely to involve the effects of evolving Western European unification on U.S. S&T relationships with individual countries, and on U.S. interactions with other European organizations such as EURATOM.

Health

The EC Commission sees its role in the biomedical and health area as maximizing the scientific and economic effectiveness of European investments in health research. Emphasis is placed on issues such as standardization of clinical protocols, studies of illnesses with particular social impact, and human genome analysis. The Commission is also seeking to stimulate Europe's diverse laboratories to provide a research base for emerging bio-industries.

At their first meeting in September 1990, the U.S. and EC Biotechnology Task Force delegations reviewed significant new biotechnology research and discussed efforts to promote public acceptance of biotechnology. Possibilities for enhanced exchange of information and collaboration on basic research were also considered. Biotechnology was also a topic on the agenda of the U.S./EC High Technology Working Group (further described below).

Environment

A major goal of the Commission is to harmonize environmental standards within the Community in various areas ranging from animal welfare to atmospheric pollution. The EC is represented in international environment fora, and works toward common positions among the member states on such issues as global climate change and ozone layer protection. The EC views its role as supporting global efforts for research and management, and as a research support arm of the newly-established European Environmental Agency. EC environmental R&D projects address global change, environmental engineering, and socio-economic aspects of environmental management. The focus of FY-90 U.S.-EC bilateral environmental activities was the annual U.S.-EC environment consultations, in Brussels.

Energy

The two main issues for Europe in the energy area are dependence on oil and gas imports (47 percent) and damage to the environment associated with energy production and consumption. The U.S. and the EC Commission inaugurated formal annual energy consultations in Brussels May 7, 1990.

Economic Competitiveness

The principal objective of EC R&D policy is to maintain and strengthen the international competitiveness of European industry in high technology sectors. Community interest in information and communication technologies, for example, relates directly to industrial competitiveness, economic productivity, and improvement in quality of life. EC measurement and testing projects are directly relevant to completion of the single European market.

The U.S./EC High Technology Working Group (chaired on the U.S. side by USTR) was established in 1983 to examine issues related to emerging high tech priorities, including specific trade-related concerns. The Group's primary role has been to provide a forum for periodic comprehensive reviews of developments, and to act as a catalyst for more specialized bilateral contacts. The Group held its fourteenth formal meeting on July 9-10, 1990, in Washington. Discussions focused in particular on the future of defense-related production and technology (see below), and on clean energy technologies. On clean energy, speakers noted that regulatory, financial and attitudinal barriers are slowing acceptance of large-potential clean technologies in both Europe and the U.S. The sides agreed pertinent discussions should be pursued in appropriate specialized fora.

National Security

The EC is not formally involved in defense-related research and development. This does not mean, however, that European defense industries do not participate in EC R&D programs. EC officials of the European Strategic Program for R&D in Information Technology (ESPRIT) note, for example, that nearly 40% of ESPRIT projects involve dual-use technologies.

The July 1990 session of the U.S./EC High Technology Working Group included broad discussion of political, economic, and other factors conditioning the future of defense-related technologies in the industrial sector. Speakers noted that governments are having to redefine security needs and how best to meet those needs with fewer resources. It was thought that cooperation will most likely become increasingly attractive from an economic viewpoint, but foreign investment in defense industries and foreign access to sensitive technologies in joint projects could, also, become politically controversial. It was noted that greater reliance on dual-use technologies could lead to trade tensions due to differing views on the appropriateness of government support for those technologies.

France

The science and technology enterprise in France has been on an upswing for several years. Growing investment in science and technology enjoys general support, impelled largely by concerns about economic competitiveness, and independence in defense S&T. National spending on research and development has reached about 2.4 per cent of gross domestic product, slightly behind Japan, the United States, and West Germany. Civilian R&D is about 1.9 per cent of GDP.

While government R&D spending has stagnated at about 1.3 per cent of GDP, industry's share has risen. France continues to give priority to selected technologies, notably space and aviation systems, nuclear energy, telecommunications and, more recently, computers, microelectronics, and biotechnology. The proposed civil R&D budget for 1991 calls for a 7.3 percent increase over the 1990 level of French francs 48.6 billion ($935 million), and puts new emphasis on industrial research and human resources.

Basic Science

France has a long-standing high reputation in certain fields of basic science, notably particle physics, solid-state physics, materials research, molecular biology, genome mapping, geophysics, chemistry, pharmaceuticals, mathematics and information and linguistics theory. However, France's reputation has been based largely on the work of a few outstanding individual scientists or small teams of scientists, while other sectors of university and public sector research have suffered from underfunding, poor equipment, and low morale. The French are now attempting to improve this situation through a variety of strategies, such as mixed teams of university, government, and industry researchers. The international reputation of French research has suffered from difficulties some researchers encounter in writing and publishing in English, but this is changing with the growing use of English in the French research community. France's Centre National de la Recherche Scientifique (CNRS) has a cooperative agreement with NSF. Renewal is being negotiated, but differences remain over intellectual property rights.

France leads Europe in the space field and is a major player in all European Space Agency decisions. France is concerned about U.S. ability to deliver on its space station commitments, and tends to push for maximum European autonomy in the space field. France is less salient in other areas of "big science" such as high energy physics and genome research. The French look with interest on the USSR and Eastern Europe for potential basic sciences cooperation, but expect Western Europe and the U.S. to remain the primary focal points.

Health

France excels in many areas of medical research, notably at the Institut Pasteur, the Institut Curie, and the National Institute for Health and Medical Research (INSERM). The French are intensifying cancer research, particularly on oncogenes. French researchers have played a leading role in AIDS research, including the co-discovery of the AIDS virus, and continue to cooperate and compete with their American colleagues. The French also are strong in tropical medicine, and are working on an apparent upsurge in malaria in some parts of the world. Like other developed countries, France faces the prospect of an aging population and a low birth rate. INSERM has a cooperative agreement with NIH, but renewal of that agreement has been delayed due to difficulties over intellectual property rights.

Environment

Until recently the French lagged well behind the U.S., Germany, and Scandinavia on environmental protection. During the past two years, there has been a significant upsurge in governmental activity in this field, due in part to international events and in part to environmental activist Brice Lalonde, who became Secretary of State for Environment in 1988. In autumn 1990 the government was to present its "Green Plan" to Parliament, foreseeing a dramatic increase in environmental spending and regulation (the Ministry of Environment received a budget increase of 43 percent for 1991, much of it due to the transfer of organizations to the ministry's control). The plan endorses the "polluter pays" principle, and envisages an environmental police force. Areas of particular concern within France include the pollution of rivers, ground water, and coastal waters, particularly by agricultural chemicals runoff.

The French also have become more active on the international environmental scene, joining with other Europeans in pressing for emission targets for greenhouse gases and with Australia in calling for Antarctica to be declared a nature reserve. A five-year memorandum of understanding on cooperation in research and information exchange between the Ministry of Environment and the U.S. Environmental protection agency lapsed in July 1989, and has not thus far been renewed or extended.

Energy

France is in a unique position in the energy field because three-quarters of its electricity is generated by nuclear power plants. This obviously has reduced French dependence on imported energy. It also has reduced incentives for investment in alternative energy technologies; France's investment in energy efficiency and other technologies remains modest. France's massive nuclear power system has enabled the French to hold down emissions of greenhouse gases to about one-third of the U.S. level. As France's first generation nuclear power plants near the end of their design lifetimes, the nuclear industry is designing more advanced models which will include passive safety features. France can be expected to market its new reactors aggressively worldwide. The U.S. Department of Energy and the U.S. Nuclear Regulatory Commission have several cooperative agreements with their French counterparts, notably in the area of nuclear safety.

Economic Competitiveness

Research and Technology Minister Curien has strongly emphasized the connection between research and competitiveness, and the government has explored several approaches to accelerating innovation in industry and the transfer of research findings to the commercial sector, including companies spun off from French research institutions and an organization called ANVAR specifically designed to promote innovation in small and medium-sized companies.

Curien and Industry Minister Fauroux issued a joint statement on September 3 on French industrial technology development policy which emphasized increasing the supply of engineers, an R&D tax credit, increased emphasis on standards, and improved protection of intellectual property rights. The policy statement foresaw continued emphasis on the technological development of small and medium industries, and continued support for large strategic programs, including silicon chip development in JESSI (Joint European Submicron Silicon Initiative), high-definition television, the future TGV (high-speed train), the "clean and efficient car," the ultra-clean agro-industrial factory, and highway safety. The two ministers also confirmed their support of the EUREKA program of trans-border cooperation on technology development. Industrial research was first on the new list of priorities in the civil R&D budget for 1991.

National Security

France has long sought independence in defense technology and has to some extent achieved it through a heavy investment in defense industries, particularly aerospace. R&D accounted for 15% of the total 1989 defense budget and was slated to receive additional emphasis in 1990-91, with an expected annual growth rate of 10%. At present France is involved with the U.S. in over 100 data exchange agreements and 14 bilateral and 13 multilateral armaments cooperation programs, but the French government is turning increasingly towards intra-European armaments cooperative efforts. France is a founding member of the Missile Technology Control Regime, and cooperates in efforts to control the spread of chemical weapons. France is not a party to the Nuclear Non-Proliferation Treaty, though French authorities argue that France essentially adheres to its provisions.

Germany

The events since the fall of the Berlin wall on November 9, 1989 have precipitated many changes in Germany, including in the fields of science, the environment and technology. Germany has long been a major European power in science and technology. Practical considerations and tradition induce Germany to continue to be closely integrated with its EC partners and other allies, including the U.S.

Basic Sciences

The dynamics of German unification affect basic science. The Federal Ministry of Research (BMFT) is reconsidering all research projects and programs to see where savings or rationalizations can be made. Exact figures of how much the BMFT budget might change are unavailable, however, spending is essentially "locked in" for the coming years on projects like Hermes and the Columbus Space Module.

Environment

Germany has become an extremely environment-conscious country. Two aspects of this environmental awareness are most important for the U.S.: official and unofficial German perceptions of the global climate change issue, and environmental cleanup of the five Laender that used to comprise the GDR. There is a widespread perception in Germany that the effects of climate change may already have set in. Laymen see a series of major storms in February 1990, two consecutive hot, dry, sunny summers, as well as other climatic "anomalies" as signs the greenhouse effect has already begun to affect the world's climate. Many technical people as well, while perhaps less sure about the immediate manifestations cited above, are also of the opinion that "the precautionary principle" should apply (i.e., that corrective measures should be taken even in the absence of certitude about climate change).

German environmental union took place along with monetary union on July 1, 1990. The then-GDR adopted FRG environmental laws and standards, to be phased in over the coming months and years.

Energy

Because of stricter FRG-level environmental standards, the area of the former GDR will be moving to phase out brown coal and will have to close some nuclear power plants. Although German firms are confident that they can make up the shortfall, energy supply will continue to be an issue which bears close watching.

Economic Competitiveness

The Daimler-Benz, Hoechst, Bayer, Siemens, Thyssen and other large firms are bywords for German industry and prosperity worldwide. However it is the "Mittelstand," German small and medium-sized companies, which most experts credit with having been the driving force behind the postwar "Wirtschaftswunder" or economic miracle. Germans see keeping this class of firms competitive as a major policy goal. The strength of these firms is their size: they are close to customers and can respond flexibly and quickly to market changes. Modest size can be a disadvantage, however, to managing the large R&D costs involved in much of today's increasingly complex and sophisticated technology.

The BMFT, along with the Economics Ministry, administers a program that supports in-plant technology development, scientific cooperation, and assists in the transfer of technology to smaller firms. According to BMFT statistics, small and medium-sized companies provided about two-thirds of all jobs in the private sector, about 12 million jobs in the former FRG. They offered more than 80 percent of all training positions resulting in places for roughly 1.4 million trainees. They produced about one half of the FRG's gross national product and accounted for nearly 40 percent of gross investment. Given the importance of this sector, the government feels that it cannot afford to let its competitiveness deteriorate. Authorities clearly hope that Mittelstand firms repeat their performance of the 1950's and 1960's and become the driving force behind an economic miracle in the ex-GDR.

National Security

By adopting a full-scope nuclear safeguards policy in 1990, the then-FRG made a major contribution in support of nuclear nonproliferation, long a U.S. goal. The Germans are now positioned to encourage other countries to adopt similar policy. The federal government is also an active member of the Missile Technology Control Regime (MTCR). Passage into law of the "Kriegswaffenkontrollgezetz" or weapons export law is another area in which the Germans took, and continue to take, great strides. The law now not only provides for punishment of illegal exporters of missile technology, but engineers and technical people who contribute to illegal weapons projects overseas, even unwittingly.

Hungary

Hungary is occupied with the issue of how to reorganize activity to fit better the emerging democratic way of life, and to decentralize. While this will increase competition for scarce resources, it is hoped that resultant improvements in efficiency and standards will help Hungarian science, economy and business to integrate better into the wider world scene. At the same time, the Hungarian scientific and business communities avidly await full access to advanced western research and higher technology, formerly closed by COCOM regulations.

The combination of a revived market economy and falling political barriers should increase commercial, academic, and government sponsored activity at all levels with the more technically advanced countries.

Basic Sciences

• The U.S.-Hungarian Science and Technology Agreement, signed in October 1989, came into effect during FY-90 at the level of a $300,000 contribution by each side. FY-91 funding is expected to be at the full level of one million dollars for each government. Priorities under the agreement are set by percentage as follows: basic science 20%, environmental protection 20%, agriculture 14%, medical sciences and health 14%, engineering research 14%, energy and natural resources 14%, others 4%.

In keeping with the spirit of decentralization and greater initiative, the Hungarian science establishment, represented by the universities, the Academy of Science (MTA), the National Scientific Research Fund (OTKA) and the National Technical Development Committee (OMFB), is seeking to clarify the roles of its constituents. With the exception of OMFB, all are trying to become more independent; however, since all became overwhelmingly dependent on government funding under Communist rule, this can not be achieved quickly.

The exact reorganization of scientific institutions has not yet been worked out. The universities, which have been fragmented by losing their medical schools and other components, expect to undergo major structural revisions. A primary objective is to regain the right to grant science doctorates, which is currently the exclusive prerogative of the Academy of Science through its research institutions. This would make it possible for the universities to strengthen their research capacity. In addition, many once famous private secondary schools are being reestablished in the hope that they can again attain the standards that produced the brilliant mathematicians and scientists that Hungary was known for half a century ago.

The Academy of Science (MTA) hopes to continue its role as "primus inter pares" among scientific institutions, albeit with an independent stance. Parliament has been asked to pass legislation giving the Academy legal autonomy starting in May 1991, while retaining substantial government funding for it. The Academy's 39 constituent research institutions would, in turn, have greater independence to select their leadership and direction. They could, if they wished, leave the Academy and integrate into the reconstituted universities. MTA sees itself retaining important functions such as continuing to be a focus for bilateral international contacts with other academies and national research bodies, and a primary advisor to the government.

The National Scientific Research Fund (OTKA), which was created in 1985 to produce a national, competitive funding source for research proposals, has been under the administrative direction of the academy. In the future it is to be independent. While it is acknowledged that OTKA has improved the standard of research project submissions, an independent role would emphasize greater impartiality in project selection.

Hungary already participates in the EC-directed PHARE and TEMPUS programs. Starting in November 1990 it will become a member of the European Science Foundation. If EC associate membership materializes for Hungary, integration into Western European scientific life would be even swifter.

Health

The current public health system has a poor reputation and a weak financial basis. Western governments and private groups, such as Project Hope, were requested to suggest ways that Hungary might revitalize its health care system. Some experts believe improvement is contingent on better management and epidemiological research rather than simply updating equipment or offering advanced health care training, but all areas can be improved.

A more open society, with greater ability to travel and to receive outside influences, brings with it increased hazard of AIDS transmission and drug use. Local authorities are anxious to cooperate with other governments and international organizations in improving treatment in these areas.

Environment

The Regional Environmental Center for Central and Eastern Europe, initiated by President Bush during his visit to Hungary in July 1989, opened to acclaim on September 6, 1990. The Center has received financial support totaling $10 million from the EC, the Netherlands, Norway, Finland, Canada, and Austria, as well as Hungary and the U.S.

Poland, Czechoslovakia, Bulgaria and Yugoslavia also signed the original charter. Other countries have expressed interest in participation and support. The Center offers four primary services: information access, development of regional environmental institutions, a clearinghouse for programs, and education and training. Initially the three vital areas of health, cost-effective pollution prevention and energy efficiency will be emphasized. The center promises to be a focal point for environmental activity in east-central Europe and an important link in increasing regional interactivity among the emerging democracies.

Energy

Changing market orientation and supply and soaring petroleum prices require a revised energy program for Hungary. In spring 1990, the International Energy Agency (IEA) was requested to make comprehensive recommendations for a new domestic energy policy. Such a plan has to take into account that petroleum imports from the Soviet Union will be increasingly restricted, that imports from all sources will be at world market prices and payable in convertible currency, and that energy efficiency and environmental concerns will have to be primary considerations in any new energy projects. Their lack of natural resources concentrates Hungarians' focus on natural gas, coal and nuclear energy as future energy expansion areas. Alternative energy sources have had limited utility; available thermal water, for example, has relatively low temperatures. Wind and solar energy sources have not been explored.

Economic Competitiveness

The establishment of a new political order entails a much broader embrace of the market system. Economic incentives for business and individuals, to be enacted starting in the last quarter of 1990, will increase the privatization of state companies and the creation of new private enterprises. OTKA nominally has a role to play in corporate research as well. With the privatization of state companies, OTKA could potentially end up as one of the scientific institutions with a more reliable source of financing outside government. The National Technical Development Committee (OMFB) is an official government entity attached to the Council of Ministers. It is tasked with providing advice, coordination of domestic technical development, as well as certain international responsibilities. There apparently has been was some discussion about transforming OMFB into a Ministry of Science and Technology. It now appears more likely that it will continue as an executive committee, providing broad policy guidelines to the government, industry, and the research community but shifting its international responsibilities from CEMA (eastern European countries) to the EC.

National Security

The collapse of the Communist party, the free election of a center-right government coalition, and the continued withdrawal of the Soviet Army have all substantially affected Hungary's national security situation and made it possible to revise COCOM export regulations on advanced technical equipment. Access to such equipment will assist in improving research facilities for Hungarian institutes and industry. In addition, exchanges in the fields of physics, mathematics, and computer science, which formerly were restricted, can now also be expected to improve. An early manifestation of this was agreement in May 1990 permitting institutions of the Hungarian Academy to take part in CERN research projects.

India

The Indo-U.S. S&T collaborations program, unique in its size and breadth, addresses fundamental research needs (physics, chemistry, climate change), provides technical assistance in areas of high priority to the U.S. (environment, health), and gives U.S. scientists access to environments, facilities, and expertise not easily available in the United States. Collaborations attain specific research results in support of objectives of federal agencies and U.S. universities. Collaborations also support U.S. foreign policy by providing access to opinion makers on important science-related issues. Collaborations are based on two major bilateral agreements and are partially funded with U.S.-owned, non-convertible Indian rupees. In addition, programs funded by the U.S. Agency for International Development (USAID) contribute strongly to the broad range of cooperation seen by the Indian public.

In 1974, India and the United States established a Subcommission on Science and Technology and later a Subcommission on Agriculture to coordinate the growing number of collaborative projects. In 1982, Prime Minister Indira Gandhi and President Ronald Reagan proposed a Science and Technology Initiative (STI) further to promote Indo-U.S. collaboration. Many of the projects were funded with U.S. government-owned rupees from the PL480 food program. In 1987, $110 million in U.S.-owned rupees were, by bilateral agreement, put into the United States-India Fund with the stipulation that they be used for furthering Indo-U.S. collaboration in science, technology, education and culture. Currently the United States-India Fund spends about 270 million rupees per year on collaborations in these four areas; of this 180 million rupees are used for collaboration in science and technology. Direct USAID support for science and technology exchange totals approximately 50 million dollars and includes annual expenditures of 5 to 10 million dollars. In addition USAID supports research and development joint ventures involving U.S. and Indian private sector firms. The participants on the Indian side are government R&D laboratories and several of the best academic institutions.

Basic Sciences

Indian prime ministers and U.S. Presidents have called Indo-U.S. S&T collaboration a key element in overall relations between the two countries. The projects have provided access to a variety of Indian scientific program managers and organizations. This includes laboratories of the Atomic Energy Commission, the Indian space research organization, and the defense research and development organization. Newspapers report favorably about Indo-U.S. collaborative projects and this contributes to a favorable opinion about the U.S. in the Indian public.

Among advantages of working in India are the large, well-trained, motivated scientific labor pool, relatively well-equipped laboratories, and often access to an environment, facilities, and expertise not available in the U.S. Universities are also interested in enriching their curricula by carrying out research on Indian geology, flora and fauna, or historical monuments. The vehicle to achieve this is the more than 300 projects of the Indo-U.S. Science and Technology program administered by the U.S. Embassy Science Office and USDA's Far Eastern Regional Research Office (USDA), as well as several major USAID-funded bilateral projects in a variety of sectors including agriculture, forestry, health and energy. On the U.S. side about 20 federal agencies and many universities participate.

All of the scientifically "hot" areas in the west are also worked on in India. Several laboratories with government funding have started research programs in high-temperature superconductivity. Indian scientists have made strong, fundamental contributions, both because physics and chemistry of metal oxides is a traditional subject of research in India, and because India has large deposits of rare earths, a main ingredient of high-temperature superconductors. There are at least four formal programs to develop an indigenous supercomputer. Three of them have recently led to some notable results in parallel processing, but all of the very large scale integrated (VLSI) circuit chips used in India are imported.

Biotechnology and genetic engineering are favorite research topics. Cold fusion experiments were copied in India only weeks after the first publications in the U.S. Indo-U.S. collaboration covers all topical physical science subjects: supernova physics, novel oxide materials, relativistic electron beam - plasma interactions. But there are also many projects that are developing underpinning for future technologies: high-strength ferrous alloys, computer simulation models for internal combustion engines, continuous casting processes. Several projects advance the state of the art of measurement: laser standards for length and frequency measurement, dissemination of standard frequency signals by satellite, scanning-tunneling microscope for surface measurements. There are more than one hundred collaborative physical science projects either active or in various stages of implementation.

Health

This is an area of great mutual interest with projects focussed on many specific diseases: lymphoid neoplasia, leprosy, enteric diseases, malaria, herpes, aids, and typhoid. There are projects in the underlying sciences: nuclear magnetic spectroscopy, conformational structure of polynucleotides. A wide range of projects deals with the development of treatment methodologies and health care delivery systems. Recently a major endeavor, the Vaccine Action Program (VAP), was started as a collaboration between the U.S. Public Health Service and the Indian Center for Medical Research. This is aimed at fighting the major, debilitating, infectious diseases.

Chapter 3: India

Environment

The Indian government and technical community are aware of the threats of global climate change, lack of drinking water, pollution of the environment, rapid deforestation, etc., but increasing population pressure and GOI budget constraints make countermeasures extremely difficult to enact. India declined to sign the Montreal Protocol for Protection of the Ozone Layer, however, there have been indications it may move to do so. Also, the Indian government and industry are beginning to show interest in developing scientific and technical skills to deal with the production and use of replacement CFC's. In consequence, a very successful September 1989 Indo-U.S. workshop in Delhi on replacements for CFC's led to several collaborative projects aiming at the reduction of CFC use in Indian industry.

India's forest cover is being reduced at a rapid rate. Awareness of the problem and its consequences is slowly rising. Collaborations are underway on plant selection, breeding, and cloning of tree species. USAID, working with the World Bank, has implemented very successful social forestry programs, but a great deal more collaboration with U.S. scientists will be needed to develop the scientific base from which to develop sound, technical solutions. As a follow-on to this project, USAID is funding a joint research program with the U.S. Forest Service and several Indian state forest services. There is widespread and technically excellent collaboration on wildlife research, including creation of institutions that will perpetuate this work, development of parks and nature preserves, and protection of religious and historical heritage sites.

Other areas of increasingly intense collaboration are climate research, global circulation models, monsoon research, marine biology, and ocean physics. A wide range of data from the Indian ocean is of particular interest to climate modelers, and these projects give U.S. researchers access to this important area and to data which are otherwise very difficult to obtain from the government of India.

Energy

Coal is a significant Indian resource. The Pittsburgh Energy Technology Center, a U.S. Department of Energy facility, is cooperating in a significant coal research program in India, with funding from the USAID Alternative Energy Resources Development Project

(AERD). The U.S. has conducted considerable research on integrated coal gasification combined cycle (IGCC) technology, which promises major environmental benefits in coal combustion. Also under the AERD, U.S. companies are involved in evaluating the potential for IGCC of Indian coals. This research could have major future benefits for the U.S. in terms of sales of U.S. energy equipment, and in extending the research base on a broader spectrum of coals. Several new projects on coal research and power plant life extension have been initiated. USAID also provides support to market-driven energy technology development with its program for acceleration of commercial energy research. Several energy technologies developed under this program are at various stages of commercial development.

Economic Competitiveness

Indo-U.S. collaborations have been and still are largely academic, directed at fundamental research or technical assistance but not at commercial products. Only a small handful of patentable discoveries have emerged over 25 years of collaborations. Most Indian scientists do not file patents. The few who do, file in the U.S. and Europe.

The recent strong U.S. government push for better allocation and protection of intellectual property rights has made Indian scientists and government officials much more aware of U.S. views, although they feel U.S. concerns may be exaggerated. The U.S. has implemented an interagency mechanism to review all new or expanded S&T projects with India for IPR concerns.

National security

The Office of Naval Research (ONR) is currently involved in 11 major multi-institutional and multi-disciplinary projects in India worth approximately 56 million rupees. Three are in oceanographic research and eight are in the physical and material sciences. An additional 35 projects worth over 80 million rupees are in various stages of GOI approval. ONR began its program in India in 1983 with a bioactive substances project in collaboration with India's National Institute of Oceanography. Stevens Institute of Technology and the University of California, on the U.S. side, and the Central Drug Research Institute and the Bose Institute in India have also participated in this project, which will terminate in early 1991. This highly successful project has resulted in the collection and identification of about 250 marine organisms of various types. 154 chemical compounds showing promising anti-fertility, analgesic, anti-viral, and anti-malarial properties have been extracted from 68 of the collected organisms.

The GOI has traditionally been hesitant to allow foreigners to participate in oceanographic research in Indian waters. The success of the ONR/NIO Bioactive Substances Project, however, built bridges of confidence between Indian and U.S. marine scientists that led to the inauguration in May, 1990 of three projects in the area of marine biodeterioration. Seven additional ONR-sponsored projects in marine biotechnology are now under consideration. In addition, collaborative projects in the areas of underwater acoustics, coastal aquaculture, and water level measurement are being considered. The Naval Research Laboratory (NRL) is the prime U.S. laboratory collaborating in ONR-sponsored projects in India in the areas of physical and material sciences. The interaction resulting from the numerous NRL/ONR projects has generated a significant and mutually beneficial flow of information between U.S. scientists and scientists from India's defense research and development institutions.

Indonesia

As a developing industrializing country, Indonesia depends considerably on S&T for its industrial and economic development. Renewal of the bilateral U.S.-Indonesia bilateral science and technology agreement, which is currently undergoing renegotiaton on an IPR Annex, will provide a mechanism for expanded science and technology cooperation.

Basic Science

In addition to numerous U.S. Government collaborative projects with Indonesia (including the USAID program), the U.S. private sector has been very active in a wide range of science and technology developments. In particular, the U.S. private sector has ongoing ventures in aerospace and avionics, telecommunications, energy and natural resources development, computers, electronics, and other fields. U.S. companies have established close relations with the Indonesian private sector and have successfully retained or expanded market shares in several key areas. The companies have also provided technology transfer and training for significant numbers of Indonesian technicians and specialists.

Health

U.S. Naval Medical Research Unit No. 2 Detachment (NAMRU-2-DET) is located in Jakarta, Indonesia and has been present in the country since the late 1960's. It is part of the U.S. Naval Medical Research and Development Command in Bethesda, Maryland. NAMRU-2 conducts medical research on diseases of military relevance which are of mutual interest to the host country and the U.S. Department of Defense. Almost all programs are conducted with Indonesian counterpart participation. The detachment has several research divisions such as: tropical medicine, including typhoid, cholera, malaria, and dengue; virology, including rotavirus, HIV and influenza; microbiology; immunology and parasitology.

Environment

Indonesia has been a regional leader in officially recognizing the importance of wise environmental and natural resources management in supporting a sustainable pattern of economic development. Indonesia has also shown increasing awareness of its international environmental responsibilities, including by its 1988 signing of the Montreal Protocol on Substances that Deplete the Ozone Layer and its participation in the Intergovernmental Panel on Climate Change. The U.S. Information Service (USIS) continues to attract many Indonesian government, academic and private sector representatives to its Worldnet Interactive Program series on environmental issues, including protection of the ozone layer, tropical deforestation, and global climate change. Cooperation with U.S. government agencies has played a prominent role in efforts to improve environmental management in Indonesia, and this continues to be an area of major interest and concern. This cooperation focuses on: tropical forest management; biological diversity conservation; sustainable agriculture; pollution and hazardous wastes management; energy, coastal, marine, and water resources management; and natural disasters and environmental phenomena.

USAID/Indonesia has taken an active role to encourage improved policy direction from the GOI and coordination among donors regarding environmental aid. The USAID mission has taken the lead in achieving a strong donor consensus in favor of a national action plan to guide environmental and natural resources policies and programs. USAID has developed a seven-year $25 million project ($18.5 million USG grant) in Natural Resources Management (NRM). The NRM project comprises studies on sustainable economic development and sustainable management of forests and protected areas.

The National Oceanic and Atmospheric Administration (NOAA) and the Indonesian Agency for the Assessment and Application Of Technology (BBPT) are negotiating a ten-year memorandum of understanding on collaboration in climate investigations. Fields of activity proposed under this MOU may include a) climate investigations, b) monitoring of the ocean and atmosphere, and c) climate applications. It is anticipated that other interested U.S. technical agencies such as the National Aeronautics and Space Administration (NASA), the National Science Foundation (NSF), and the Office of Naval Research (ONR) will also participate in collaborative climate research organized under this agreement.

Energy

Indonesia is an OPEC member and has a policy to expand rapidly domestic production and use of both natural gas and coal. The country is also considering nuclear power as part of its long-term energy strategy. On June 20, 1990, Indonesian Minister of Mines and Energy Ginandjar met with DOE Secretary Watkins and they agreed to hold annual bilateral energy talks at the working level. Both the USG and GOI wish to use the bilateral energy consultations to expand cooperation in such areas as nuclear power and clean coal technology, and to seek increased investment by U.S. firms in Indonesia (with Indonesia pointing especially to exploration for oil in Indonesia's eastern frontier). Indonesia-U.S. peaceful nuclear cooperation is highlighted by the successful nuclear Joint Steering Committee (JSC) arrangement which was created for the purpose of enhancing cooperation in several key nuclear fields, including radioisotope production and applications, instrumentation, nuclear safety, and nuclear training.

As Indonesia seriously considers the nuclear power option, the Indonesian National Atomic Energy Agency (BATAN) has requested that the JSC expand its area of cooperation to include nuclear power technology. Despite ongoing financial constraints and questions regarding the development of a nuclear power program in Indonesia, the government appears to be preparing for this eventuality. Both the Indonesian Minister for Research and Technology and the Director General of BATAN have expressed keen interest in the Westinghouse safe advanced light water nuclear power reactor design, model ap-600, and the General Electric simplified boiling water reactor design, SBWR.

Under an Indonesian Center for Science, Research and Technology (PUSPIPTEK) Energy Research Laboratory project, the USAID mission is assisting in the development of a high-quality non-oil/gas energy research laboratory as a part of a larger effort to improve technical capabilities in assessing energy efficiency and conservation options. A program is under development to establish stronger ties between the laboratory and potential users. Indonesia has quite large, but relatively untapped, land coal deposits which are expected to be an important future energy resource.

National Security

Amindo Jaya (American-Indonesian success) is the name of a joint survey program between the U.S. Naval Oceanographic Office and Dinas Hidro-Oseanografi. The program encompasses geodetic, hydrographic and magnetic surveys. The data collected are used by the Defense Mapping Agency (DMA) in conjunction with the Indonesian collaborators to produce nautical charts for safe navigation. The waters of the Indonesian archipelago are among the most important for such surveillance because Indonesia straddles sea communications between the Pacific and Indian oceans. Amindo Jaya costs the United States approximately 15 million dollars per year, primarily in survey ship operating costs.

Israel

Israel's small size and population belie its scientific and technical expertise. U.S. S&T cooperation with Israel has been active for many decades and continued to be strong and vigorous in Fiscal Year-90.

There are three U.S.-Israel binational foundations - the Binational Science Foundation (BSF), the Binational Industrial Research and Development Foundation (BIRD), and the Binational Agriculture

Research and Development Fund (BARD). Each foundation has an endowment contributed by both governments, the interest from which is used to fund cooperative research projects. A number of USG technical agencies have formal international bilateral agreements for cooperation with counterpart Israeli agencies. Israeli scientists also are very successful at competing directly for research money from the international programs of a number of USG agencies, including NIH, DOD, and USAF.

USAID funds two S&T research programs in Israel, which have the broad goal of assisting Israel in its attempts to normalize relations with neighboring countries and the rest of the world community. Congress established the Middle East Regional Cooperation (MERC) fund in 1979 to foster cooperation between Israeli scientists and scientists from neighboring Arab states. To date only Egypt has participated in the program. Each project is a trilateral effort, involving Egyptian, Israeli, and U.S. scientists. In Fiscal Year-90, Congress earmarked $7 million for the program.

Two new MERC projects, an animal health research project and a project on the technological and environmental health aspects of wastewater reuse for irrigation, were initiated in Fiscal Year-90. There are now nine active projects, five in agriculture, one in marine technology, two in health, and one in wastewater reuse for irrigation. USAID's Cooperative Development Research (CDR) program funds cooperative projects between Israeli scientists and scientists in less developed countries. $2.5 million were committed to 12 new projects in Fiscal Year-90. The total number of active CDR projects is approximately 120, with total funding of over $19 million.

Basic Sciences

The Binational Science Foundation (BSF) funds most bilateral cooperative activities in the basic sciences and supports research in all fields except agriculture. During Fiscal Year-90 approximately 130 new projects were approved, with total first year budgets of $3.96 million. BSF spent approximately $12.8 million for new and continuing grants and workshops in Fiscal Year-90. Approximately 450 active grants were supported in Fiscal Year-90. Six joint U.S.-Israel workshops were cosponsored by BSF in Fiscal Year-90 in the fields of membrane physiology, light energy conversion, marine symbiosis, optimization analysis, astronomy, and partial differential equations. Since the establishment of BSF in 1974, approximately 1900 research grants have been awarded totalling some $100 million. BSF has supported projects at over 200 U.S. research institutions (universities, federal laboratories, hospitals, and private institutions).

Health

In November 1989 a high level U.S. delegation led by HHS Assistant Secretary for Health Dr. James Mason, and including the directors of the National Institute on Drug Abuse and the National Institute for Alcoholism and Alcohol Abuse, visited Israel to participate in a U.S.-Israel Binational Symposium on Substance Abuse. The symposium was the fifth held under auspices of the 1980 HHS-Ministry of Health (MOH) Memorandum of Understanding (MOU) for Cooperation in the Field of Health. During a January 1990 visit to Israel, HHS Secretary Dr. Louis Sullivan signed a 5-year renewal of the HHS-MOH MOU with then Israeli Minister of Health, Mr. Yaacov Tsur.

BSF is a strong supporter of research in the health fields. Between 45 and 50 percent of its annual research budget goes to projects in the health and life sciences fields. In Fiscal Year-89 (latest available figure), of $90.7 million that NIH awarded to foreign scientists for its grants and contracts and visiting scientist programs, Israeli scientists received $5.9 million (only Canada and Japan successfully competed for more).

Environment

Israel is a world leader in many aspects of the field of water resources and waste water reuse. A number of Fiscal Year-90 environmental cooperative activities focused on this important field. In early Fiscal Year-90, the Interior Department's Bureau of Reclamation (BUREC) concluded extension of an MOU with the Israeli Ministry of Agriculture for cooperation in water resources development. Possible areas of cooperation under this MOU include drainage, water quality control, desalination, and technology of deep wells. BUREC also concluded a new, separate MOU with the Israel Oceanographic and Limnological Research (IOLR) Institute, for cooperation in water resources development.

During FY-90, the U.S. EPA and the Israeli Ministry of the Environment (MOE) worked on an agreement for cooperation in the field of environmental protection. The MOU should be concluded in early

FY-91. A joint workshop on environmentally safe reuse of waste water, to be held in Israel, is being considered as an early activity under this MOU.

Energy

In February 1990, PAMA, the Israeli energy resources development company, opened an oil shale-fired demonstration plant for the generation of process steam and electricity. The plant can produce the equivalent of 12 MW of power. With this plant and the Weizmann Institute's Solar Energy Research Center, Israel now has two state-of-the-art energy research facilities. In June 1990, two joint U.S.-Israeli workshops were held concurrently in Israel on photosynthesis and energy-belated biological sciences, and photoconversion and photocatalysis. Both workshops were hosted by the Israeli Ministry of Science and Technology (MOST) and held under auspices of the 1987 DOE-MOST MOU for Cooperation in Basic Energy Sciences.

During FY-90 DOE also began negotiations with the Israeli Ministry of Energy and Infrastructure (MOEI) to finalize a new MOU for cooperation in energy research and development. This agreement will replace a similar, recently expired DOE-MOEI MOU.

Economic Competitiveness

The Binational Industrial Research and Development Foundation (BIRD) supports joint R&D projects between U.S. and Israeli companies toward introduction of some product or process into the marketplace. In FY-90, 34 projects, with total budgets of $10.3 million, were approved. Since its inception in 1978, BIRD has spent some $84 million supporting approximately 257 projects; as of mid-1990, 115 of the projects have had sales of products. 184 U.S. companies and 157 Israeli companies have worked together on BIRD projects. A major milestone was reached in FY-90 as the cumulative amount of sales of BIRD products exceeded $1 billion.

National Security

Recognizing Israeli expertise in defense-related R&D, the U.S. Department of Defense has a strong program of cooperative R&D activities with Israel. One aspect of that cooperation is Israeli participation in the SDI Program. Israel has been the largest foreign participant to date in that program, with Israeli firms, mainly Israel Aircraft Industries (IAI), receiving contracts worth $193.3 million over the past four years, of which the U.S. contributed $151.4 million. The program includes the Arrow anti-tactical ballistic missile demonstration project, a theater ballistic missile defense test bed for hypervelocity guns, and systems engineering and integration. In July 1990, the USG and GOI agreed in principle to proceed with phase two of the Arrow program. The scope and funding of phase two is still to be finalized. In August 1990, the first Arrow missile test took place.

Under DOD exchange programs, 34 Data Exchange Agreements (DEA) with Israel have been implemented, and 12 new DEA's are under review. These exchanges cover subjects such as electronic warfare, laser radiation, defense against chemical agents, ammunition packaging, and food preservation. Under the scientist/engineer exchange program, four Israeli scientists are in the U.S., and one American scientist is doing research in Israel. The Department of the Air Force's European Office of Aerospace Research and Development (EOARD) also supports R&D projects in Israel. That office funded 11 research contracts to Israeli scientists in Fiscal Year-90, totalling $1.26 million. These contracts were for projects in fields such as structures and materials, electronics, geophysics, life sciences, SDI, and laser physics.

Italy

The United States and Italy enjoy a uniquely broad and deep level of S&T cooperation, from basic physics and health research to cooperation in the development of space systems and superconducting magnets. Italy spent the equivalent of about $10 billion on R&D in 1989, making it sixth in S&T spending, according to OECD figures.

A bilateral S&T umbrella agreement signed in 1988 and due to be reviewed in Rome in November 1990 brings together complementary motives. The umbrella agreement is an overarching document for seventeen separate specific areas of cooperation usually defined in Memoranda of Understanding. With the movement toward a unified European market in 1992, there is some tendency for Italy to turn increasingly toward European partners, in the EC Framework or EUREKA programs. However, Italian officials hold that this will not be at the expense of bilateral cooperation with the U.S.

Chapter 3: Italy

Basic Sciences

A U.S.-Italy MOU governing basic science cooperation is pending between the National Science Foundation and the National Research Council. It is currently unsigned because Italy has objected, like some other European states, to U.S. intellectual property rights (IPR) language. The U.S. provided Italy with new suggested IPR language and was awaiting an Italian response as of the end of FY-90. Meanwhile, physical sciences cooperation continued at a strong pace, e.g., the Italian Institute for Nuclear Physics (INFN) is funding more than 100 Italian physicists at U.S. labs, including the Stanford Linear Accelerator (SLAC) and Fermilab. The U.S. has sent more than 100 physicists to work in Italy at labs such as Gran Sasso and Frascati. Fiscal Year 1990 saw new physical sciences agreements. For example, the Italians have decided to participate in an intermediate energy electron accelerator project (CEBAF), and in June an understanding was reached between synchrotron teams in Trieste and Berkeley to cooperate as respective facilities are completed in the early 90's.

Several Italian teams have signed on to do experiments on the Superconducting Supercollider (SSC), which would entail their building some detectors. Genoa's Ansaldo firm is one of the leading commercial producers of superconducting magnets, and is competing for the SSC contract in a joint venture with the U.S. firm Grumman. However, higher Italian science policy authorities are apparently still considering the proposed large hadron collider at the European Organization for Nuclear Research (CERN) facility in Geneva as an alternative national investment. Any large support from Italy for the SSC would come on top of central budget funding of $100 million Italy is obliged to provide annually for CERN, and would need a Council of Ministers political decision. That is, it will not be made strictly by science policy officials on science grounds.

Bilateral space cooperation is large and important to both nations. The U.S. is set to launch an Italian satellite concept, the Tethered Satellite System (TSS), in December 1991. The first Italian astronaut will accompany that flight. In 1992, the U.S. will use another Italian concept, the IRIS upper stage launcher, to put the LAGEOS global positioning satellite in orbit. Italy is a major force behind the Columbus Project's attached pressurized module, the European contribution to Space Station Freedom. According to Italian business and government leaders, uncertainty in U.S. space station funding makes it difficult for Italy to develop plans smoothly for its own portion of the station.

Up to 12 percent of Italy's space budget may go for earth observation in the coming five years. Rome is therefore working closely with the U.S. to see if Italy can play a useful role in international coordination of these issues, particularly on global change research.

Health

In 1989, about 12 percent of appropriated Italian R&D funds went to health and the environment, with the largest portion of this percentage going to health research. Active programs include AIDS, cancer, microbiology and the neurosciences. Italy provides the second largest foreign body of researchers at the U.S. National Institutes of Health, exceeded only by Japan.

Environment

The United States and Italy have an agreement for cooperation in environmental matters, but activity under the agreement has been modest. In early January the U.S. government offered training programs on identifying, siting and handling hazardous and toxic waste, but the Italians did not reply formally. On global change policy Italy, like other European countries, supports an early commitment to deep reductions in carbon dioxide emissions. However, research efforts on global change issues are fragmented between the Ministries of Research, Civil Protection, and Environment. The Ministry of Research has a great deal to offer a potential program on global climate change in that it plans to spend up to 12 percent of its space budget over the next five years on remote sensing programs and hardware such as the SAR X and ERS-1 and ERS-2 satellites.

A broad-based program of environmental research has been rather slow in getting off the ground. The Ministry of Environment, created in 1987, received its first funding in 1990. Some industrial firms are doing first-rate research on environmental questions. One example is the Ferruzzi Company, which recently moved into production of a biodegradable form of wrapping based on grains. Another example is Ansaldo Company research on sensors and the use of informatics in monitoring of environmental damage.

Energy

Energy research in Italy has been impelled over the last three years by the 1987 referendum in which Italian voters decided to abandon nuclear power, but the direction of research is unclear. For the near term research seems oriented toward alternative energies and conservation. Research at the Nuclear and Alternative Energy Agency (ENEA) includes exotic power sources such as magnetohydrodynamic drives and less exotic ones such as fuel cells. Along with the National Electricity Company (ENEL) and the National Hydrocarbons Company (ENI), ENEA is also doing research into clean coal technologies. The GOI has not given up hope for use of nuclear power as an alternative to its extreme dependence on imported forms of energy (including electricity from the French nuclear industry). Italy cooperates through DOE with Westinghouse and General Electric in the search for a passive or intrinsically safe nuclear reactor.

DOE regards the Italians as valuable partners in research into all forms of coal combustion technology, including fluidized bed research. Bilateral energy cooperation was to be renewed and enhanced in October 1990 under a memorandum of understanding between DOE and the Ministry of Industry.

Economic Competitiveness

Some in Italy are unhappy with the country's rate of technological innovation as applied to development of new high tech products. An industrial association published a report in early 1990 which showed that Italy lost ground across the board in the 1980's in its ability to export high technology products. Statistics tend to bear this out. One remedy Italian businessmen see is joint ventures with U.S. firms. ATT's cooperation with Italtel is one example, as are the teaming of Merck & Co. Inc. with the Italian pharmaceutical firm Sigma Tau in a major new microbiology lab near Rome, and a joint venture of Fiat Spazio with LTV of Texas to develop an improved space launch vehicle. Recently Hercules Incorporated and BAT International established a factory in Italy to develop high tech products, possibly including a portion of the new Pegasus launch vehicle.

The Italian government also endeavors to encourage innovation through domestic programs. For example, the large financial company IMI disperses grants and soft loans for large to medium sized firms seeking to bring new technologies to the market. Italian officials claim these supports are available to foreign firms, including American ones, that are willing to establish a presence in Italy. The Nuclear and Alternative Energy Agency (ENEA) has a program of technology transfer to improve the production process of small firms with informatics and communications systems, for example, in the ceramics and textile industries.

U.S. ability to compete in Italy is hampered somewhat by the lack of proper intellectual property protection, particularly for software producers. This is not specific to Italy, particularly as the EC Commission gives consideration to a new software directive.

National Security

The U.S. has tabled a draft agreement to increase research cooperation in national defense laboratories by initiating an exchange of scientists. The Italians are engaged in research in the Strategic Defense Initiative. An Italian firm, Ansaldo, claims to be the first foreign firm to have won a contract under that program.

At a meeting in Erice, Sicily, of the twentieth anniversary session of NATO's Committee on Challenges of Modern Society (CCMS), Italy proposed several pilot research programs and has urged other members to make the committee a more political and less technical body.

Italy's export control system does not have effective enforcement mechanisms to protect adequately against diversion of its large-scale sophisticated technical production. The government has drawn up a draft export control law, but during FY-90 did not submit it formally to parliament. Passage of this law would strengthen enforcement and promote Italian conformity with the COCOM-agreed common standard level of effective protection.

Italy is a firm supporter of the nuclear Non-Proliferation Treaty. It is also a member of the Missile Technology Control Regime, in which it takes an active part.

Japan

While U.S.-Japanese cooperation in basic sciences is rich, Japan poses significant challenges in the high-tech industrial arena, and in some areas will likely be the source of the best available technology at the lowest cost for national security applications.

Under the U.S.-Japan S&T Agreement, annual meetings alternate between the two countries. Meetings in 1990 were in the U.S.; in 1991 they will be in Japan. In 1990 the Japanese sent delegations to the U.S. for meetings of the Joint High Level Advisory Panel, Joint Working Level Committee, and the ministerial-level Joint High Level Committee (U.S. Presidential Science Advisor Dr. D. Allan Bromley and Foreign Minister Nakayama are co-chairs). The latter Committee provides a unique opportunity to discuss annually the overall U.S.-Japan science and technology relationship.

Basic Sciences

The Japanese government is committed to increasing its investments in basic research and international cooperation. According to a recent government estimate, expenditures in JFY 1989 on basic research reached 1.39 trillion Yen (about $11 billion), up 8.0 percent from the previous year. About half of basic research funding goes to the Ministry of Education, Science, and Culture (MONBUSHO) to support university research in Japan. MONBUSHO is channeling more funds for grants to university researchers. It plans to support special research projects on global climatic changes in the Asia-pacific area and on biomolecular mechanisms.

Genome research is also receiving priority. In JFY 1991, MONBUSHO began a 5-year human genome project funded at five hundred million yen (almost $4 million). It established a one billion yen fund for human genome research and will build a genome analysis center. The Ministry for Agriculture, Forestry, and Fisheries (MAFF) expected to increase its efforts in rice genome research, already world class, by $230 million during the next ten years. In JFY 1991, the Science and Technology Agency (STA) is spending some $6 million dollars on human genome mapping/sequencing. That agency also supports basic research, especially in materials research (including superconducting materials), and life, space, and marine sciences. STA's total R&D budget for Fiscal 1990 was 204.9 billion yen, an increase of 3.7 percent over 1989.

One of the major projects was to be construction of a Synchrotron Orbital Radiation (SOR) facility. This typifies a large investment of Japan in synchrotron facilities, expected to leap in number from the current 17 to as high as 90 by the end of the century. Partly motivating this investment is direct industrial applications in new materials and X-ray lithography. Another major event was commissioning of the world's deepest-diving submersible, the Shinkai 6500.

The STA and its affiliated organizations have been highly active in cooperation with the U.S., especially in space and nuclear energy. Of note are "postdoctoral fellowships" provided by both STA and MONBUSHO for foreign scientists to conduct research in Japanese government or university laboratories. The National Science Foundation and the National Institutes for Health are responsible for recommending U.S. candidates. Through these postdoctoral fellowship programs and other opportunities such as NSF's Japan Initiative, over one hundred Americans are participating in long-term research activities in Japan, up from only a handful a few years ago. One of the highlights of science activity over the past year was initiation of the Summer Institute program, under the auspices of the Task Force on Access under the U.S.-Japan Agreement on Research and Development in Science and Technology (UJST). Through this program 25 American graduate students in science and engineering fields were brought to Tsukuba Science City for a two-month stay in which mornings were spent studying the Japanese language and afternoons were devoted to conducting research with Japanese scientists in thirteen government-funded institutes.

The United States also has been a participant in the first megascience project initiated by the Japanese government, the human frontier science program (HFSP). In March 1990, HFSP announced its first grants, which included 29 research projects involving 159 researchers of which 36 are Americans.

NSF has maintained bilateral scientific relations with Japan and has maintained an office at the U.S. Embassy in Tokyo for almost 30 years. That agency has put recent emphasis on establishing programs aimed at actively encouraging U.S. scientists and engineers to work in Japanese laboratories, as opposed to facilitating cooperative research involving U.S. investigators who are already convinced of the benefits of such collaboration. In 1988, NSF announced a set of initiatives negotiated with several agencies in Japan aimed at increasing U.S. awareness of the potential benefits of cooperative research with Japanese research institutions, and at building more long-term relationships with them. The participating Japanese agencies have contributed financial resources to demonstrate commitment to the comparable access principal.

The number of U.S. scientists and engineers going to Japan for long term working visits is increasing substantially as a result of these initiatives. Prior to 1988, only a handful of U.S. investigators went to Japan each year for such visits. Between May 1988 and the present, NSF has made awards to support over 100 investigators for such visits. While the numbers are still relatively small, the trend is positive.

Health

One of the oldest U.S.-Japan projects, the Cooperative Medical Science Program, held its 25th anniversary celebration in Tokyo in July 1990. The benefits of the joint activities of this multi-panel organization (including panels on cholera, hepatitis, tuberculosis, malnutrition and immunology) have spread from Asia to Africa, Latin America and the developed world.

Reflecting the increasing occurrence of AIDS worldwide, an AIDS panel was added in 1987. Initial reports on vaccine development have been issued and panel members already are planning cooperative studies for the 1990s. As of June 1990, AIDS in Japan was a relatively minor problem, with just over 1400 HIV-infected persons of whom about 20 percent have AIDS.

Another high priority is care of the aging. In Japan, the proportion of persons aged 65 and older in the total population has increased from 7.1% in 1974 to a current 12.0%, a figure which is expected to double in the next 30 years. By 2020 the proportion of Japanese aged 65 and older is expected to approach 40% of the working age population, (15-64). Since 1984, Japan and the United States have been cooperating on biomedical research relating to aging and the elderly. In December 1990, the U.S. National Institute on Aging and the Tokyo Metropolitan Institute of Gerontology were to hold a third joint symposium under this agreement.

Chapter 3: Japan

Environment

Environment and global change issues have moved toward the center of the GOJ agenda over the last two years. Japan chaired the Energy and Environment S&T group of the IPCC's Response Strategies Working Group (RSWG). Domestically several agencies are involved in environmental policy and research, principally Japan's Environment Agency, Science and Technology Agency (STA) and MITI. Japan's Science and Technology Agency (STA) has over two dozen programs totalling over 10.5 billion yen (approximately $80 million) in JFY 1991 which comprise its "green planet project." These include research on the global warming effects of aerosols, clouds, monsoons, and forests; monitoring the oceans by satellites and submersibles; and expanding a global warming data network system.

The Environment Agency and STA have reorganized their environmental research institutes in Tsukuba Science City to encompass global environmental research.

In July, the Ministry of International Trade and Industry (MITI) began its own Research Institute on Innovative Technology for the Earth (RITE). In autumn 1990, the Japanese Government adopted an action plan, drafted by the Environment Agency, to stabilize greenhouse gas emissions (excluding CFCs controlled by the Montreal Protocol) by the year 2000 at 1990 levels. It also adopted a MITI proposal for a 100-year program (New Earth 21) to restore the Earth's environment.

U.S.-Japan environmental cooperation occurs under the 1975 bilateral Environmental Agreement and the 1988 "umbrella" S&T agreement. Under the Environmental Agreement, this cooperation has been very useful to the United States in facilitating the transfer of Japanese technology, statistics, and analytical techniques. Fourteen panels (including air pollution-related meteorology, environmental impact assessments, water quality controls, solid waste management) operate under the Environmental Agreement, and the Japanese have proposed another panel on protection of the global atmosphere. The Environment Agreement's next Joint Planning and Coordinating Committee meeting will be in 1991 in Japan. Under the S&T Agreement, joint workshops have been held on natural hazards mitigation, and will be held in early 1991 on global change.

Energy

Increasing energy demand together with rising costs of energy supplies and environmental impacts of energy use will impel related research in the 90's in Japan (and elsewhere). Energy cooperation between the U.S. and Japan continued in FY-90 across a wide spectrum, ranging from studying responses to radiation at the Radiation Effects Research Foundation at Hiroshima and Nagasaki, to high-energy physics and fusion research. USDOE is working with Japanese counterpart agencies, primarily through a series of memoranda and contracts, in the fields of clean coal technology, solar energy and in a variety of nuclear-related areas including breeder reactor development, nuclear safety, waste management and the development of advanced power reactors.

In July 1989, DOE signed a 5-year contract with the Central Research Institute of the Power Industry of Japan to facilitate CRIEPI's participation in DOE's ongoing pyroprocessing development efforts of its integral fast reactor program. In February 1990, the bilateral umbrella Energy Research Agreement was renewed for five years. Bilateral discussions continued throughout the year to develop arrangements for the transport to Japan of plutonium recovered from reprocessing in the UK and France. Japan continued work on its spent fuel commercial reprocessing facility in northern Honshu.

Economic Competitiveness

The major S&T factor in Japan over the past two decades has been the growing investment by Japanese industry in research and development. In contrast to the U.S. where only 50% of R&D is funded by industry, the Japanese private sector now accounts for four out of every five yen of national R&D expenditures, which in 1989 totalled an estimated 11.86 trillion yen (about $90 billion, 2.91 percent of GNP). In just eight years the ratio of spending for research to total sales rose nearly 70% from 1.5% in 1980 to 2.6% in 1987; some major high tech firms spend over 10% of sales on R&D.

The scope of Japan's technological achievement is similarly impressive. Japanese industry ranks among the world's leaders in most categories with few exceptions, e.g., aerospace and software.

Japan will continue to be a strong economic competitor in the 1990's. In absolute terms, the U.S. spends more than Japan on R&D. However, as a proportion of GNP, Japan spends nearly 50% more in civil R&D than the U.S. Increasingly, Japan is turning toward international cooperation in its government R&D efforts, and has proposed cooperative programs in advanced manufacturing techniques and optical computing.

National Security

The U.S. may increasingly look to Japan in the 1990's for some of the best available technology at the lowest cost for national security applications. While there may be few if any complete defense-related systems available in Japan of interest to the U.S., Japanese industry leads in many of the component and manufacturing technologies useful in building future weapon systems.

The United States and Japan have eight agreements on mutual defense assistance. They facilitate exchange of classified patents and other data, transfer to the United States of Japanese military technologies, and Japanese participation in strategic defense initiative research. Moreover, the Japanese responded positively to several proposals from DOD for cooperation in broad dual-use technologies.

Korea

Korea seeks to be among the top ten technologically advanced nations by the end of the decade. The United States continues to be Korea's foremost partner for S&T cooperation, notwithstanding a current impasse over the U.S./Korea S&T cooperation agreement. The U.S.-Korea intergovernmental science and technology umbrella agreement expired in late 1988. Negotiations for a new agreement continue at a slow pace due to U.S. requirements to protect intellectual property rights.

Basic Sciences

Work in preexisting S&T areas has continued at a near-normal level, pursuant to Article II of the expired agreement which provides for cooperation in areas already established. Moreover, close working relationships long established between Korean scientists and their

American counterparts, derived from common educational and work experiences, remain part of the fundamental fabric of the U.S.-Korean S&T relationship. However, longer term cooperation and close ties with the U.S. in the S&T area remain unclear.

As, in the Korean perception, the U.S., Japan and other industrialized nations become more protective of their S&T research and advanced technology, Korea is seeking to gain access to less costly advanced technology through bilateral relationships with new partners, including the Soviet Union and East European countries, which are looking for relationships.

Basic sciences cooperation between the U.S. and Korea over the years has been principally conducted pursuant to an agreement between the U.S. National Science Foundation (NSF) and its Korean counterpart, the Korean Science and Engineering Foundation (KOSEF). In FY-90, there were some 25 projects of varying degrees of significance undertaken pursuant to this agreement. Korean basic science initiatives continue to be constrained by lack of sufficient government and industry financial and institutional support.

The bulk of Korean R&D funding goes to applied research to develop new product and production technologies. Unlike in the U.S., research in Korea has not traditionally been conducted at universities, but at government institutes and private firms. There were some initiatives in FY-90 undertaken by KOSEF to develop and support a network of research centers at universities around the country to promote and underwrite basic science activities. These university research facilities are intended to become centers of excellence that would ultimately gain international recognition and attract researchers from abroad, further to strengthen Korea's research base. There are currently thirteen such centers, with more to be added in 1991.

Korean scientists are also keenly aware of the importance of "big science" tools such as the U.S. Superconducting Supercollider, and are likely to participate in these international projects to the extent that resources allow. In this regard, Korean support for the SSC program has been expressed at the highest levels of government, although funding for this program will be a significant issue in Korea.

Chapter 3: Korea

Environment

Environmental matters in Korea have become a key domestic concern, highlighted by the upgrading of the environment administration to a ministerial-level agency. While the U.S. has no active agreement with Korea regarding environmental matters and there are no current cooperative activities due to the termination of the U.S./Korea S&T umbrella agreement, Korea has exchanged views with the U.S. on international environmental issues where Korea is now becoming an player. U.S. environmental officials also have responded to Korean requests for publicly available U.S. information, to support development of Korean domestic environmental standards and regulations.

Energy

U.S.-Korean energy cooperation has a long and successful history, particularly in the areas of nuclear power and energy research. Excellent, well-established cooperation between the U.S. Nuclear Regulatory Commission (NRC) and its Korean counterpart continues to enhance Korea's capabilities in regulation, inspection, emergency response, nuclear safety and joint research. This has entailed exchanges of information mutually beneficial to both countries. Exchange programs with the Department of Energy (DOE) have provided training in spent fuel management, fuel fabrication technology and other areas supporting broad U.S. nuclear policy objectives. Regular discussions on peaceful applications of nuclear energy offer a forum for consideration of nuclear policy matters, including issues arising in the international atomic energy agency.

Coal research cooperation, too, has been a fruitful interaction for both countries carried out under an agreement between the DOE'S Pittsburgh Energy Technology Center and the Korean Institute of Energy resources. Energy demands over the past year have far exceeded the forecasts of Korean energy experts and are expected to continue to grow at an accelerated pace.

Nuclear power and coal will play an important part in Korea's energy mix in the years ahead. Nuclear power currently provides over 50% of the country's electrical supply. U.S. companies have supplied nine of twelve of the country's nuclear power plants, are currently constructing two more, and are negotiating contracts for two additional units. This large presence stems from early and continued U.S. participation in and support of Korea's nuclear energy program and is testament to the benefit derived from early S&T cooperation. Korea's growing need for energy and heightened environmental concerns will also translate into need for more coal imports and clean coal technology. These provide commercial opportunities for the U.S., as well as for S&T interactions.

Economic Competitiveness

Korea's economic investment in S&T research has predominantly focused on applied research (including reverse engineering), which has enhanced short-term competitiveness in the marketplace. Korea's S&T successes to date can be attributed in considerable part to U.S. support and access to American research and technology (especially in the nuclear technology area), and to the U.S.-educated and experienced Korean scientists and engineers who currently occupy many key positions in the S&T community. While U.S. support and cooperation will continue to be important for Korea, need for it may dilute over time as Korea seeks other partners.

Mexico

President Carlos Salinas de Gortari's personal commitment to the advancement of Mexican efforts in science, technology and economic development continues to drive an already close cooperation between the U.S. and Mexican scientific communities. This cooperation spans many topics but during the past year was especially close in environmental affairs. U.S.-Mexican scientific cooperation is overseen by a Joint Mixed Commission chaired by the Department of State's Bureau for Oceans and International Environmental and Scientific Affairs (OES) and the Mexican Secretariat of Foreign Relations (SRE). The U.S. Embassy's Science and Technology section oversees approximately 30 Memoranda of Understanding (MOUS) between U.S. and Mexican agencies under the Mixed Commission's purview.

Basic Sciences

The U.S.-Mexico Mixed Commission for Cooperation in Science and Technology met for the seventh time. A chief accomplishment was standardization and simplification of Mexico's research permit process. U.S. researchers now enjoy more rapid and less complicated access to research in Mexico, and a dialog is now possible to make the permit process still more responsive to scientific researchers. The U.S. dominates the number of requests for research permits in Mexico, with approximately 80 of all requests registered.

While a substantial amount of U.S.- Mexico S&T cooperation is conducted through agency-to-agency channels, as exemplified below, even more occurs directly between researchers and scientists in industries, universities and private institutions.

The National Science Foundation (NSF) and Mexico's National Science and Technology Council (CONACYT) have carried on a program of collaborative research for almost 20 years. Use of biotechnology genetically to engineer drought-resistant crops is currently high on the agenda for cooperation, together with linking the U.S. supercomputing network via satellite to additional academic institutions in Mexico. The National Autonomous University of Mexico (UNAM) and Monterrey Technological Institute already have such access.

NSF and CONACYT hope to expand cooperation on natural disaster mitigation, specifically for earthquakes and hurricanes, and in neuroscience, new materials research, meteorology and climatology, tropical ecology, modeling of natural phenomena and science education. The NSF also hopes to apply its expertise to development of statistics on the status of S&T in Mexico.

The U.S. Department of Agriculture (USDA) and the Secretariat for Agriculture and Water Resources (SARH) are committed to continue technology transfer, scientific and technical exchanges, collaborative research involving universities and research centers, reimbursable technical assistance, and training opportunities. The U.S. Bureau of Mines (BOM) and CONACYT have agreed to work together in materials science and superconductors. Improving the study of materials science is a stated priority of the GOM. The BOM will conduct a two-day symposium involving U.S. and Mexican experts on new materials, technical barriers, institutional-financial-legal constraints and industry structure.

The National Institute of Standards (NIST) has also had a long term relationship with CONACYT. NIST has used its guest researcher program to bring Mexican researchers to the U.S. for one to two years to work in the fields of basic metrology, materials science, radiation research, analytical and biochemistry, quantum chemistry, surface science and the characterization of thin films, manufacturing engineering, and fire research. An MOU is currently being negotiated to provide a framework for exchange of scientific and technical knowledge, and augmentation of scientific and technical capabilities of NIST and CONACYT, with respect to the chemistry, physics, and engineering measurement sciences.

The U.S. Geological Survey (USGS) has a long history of working with scientists, universities, and governmental agencies in Mexico. Cooperative activities have included regional geologic mapping, mineral exploration and resource assessment, monitoring and reduction of geologic hazards, water resource studies and cartographic mapping. For example, the USGS is nearing completion of a new MOU with UNAM with annexes covering cooperation in geologic mapping, natural hazards assessment and earthquake monitoring. The USGS has also just established a new Center for Inter-American Mineral Resource Investigations in Tucson, Arizona, to advance mineral resource investigations in the Americas.

The U.S. National Academy of Science (NAS) and its Mexican counterpart, the Academy for Scientific Research (AIC), have identified a joint project to assess the availability and vulnerability of water resources in the valley of Mexico.

Health

Ongoing U.S.- Mexican activities in the health area range from scientist exchange programs in the health sciences to broad areas of public health cooperation. For example, USDA and SARH are working closely to improve technical and sanitary regulations to protect animal and plant health. The Food and Drug Administration (FDA) has indicated an interest in exploring cooperation with Mexico in the areas of biotechnology and agriculture as they relate to animal drug products. FDA is also interested in the areas of biotech, neuroscience and new materials property and development as they relate to medical devices. Other areas of interest include in-vitro diagnostic products, radiation exposure, and nervous system development.

The National Institutes of Health have indicated interest in exploring research cooperation in several priority areas identified by Mexico, including neuroscience, hypertension, cancer, infectious and tropical diseases, aids, virology, nutrition, and environmental problems along the U.S.-Mexican border. The Centers for Disease Control (CDC) would like to work with Mexico's Secretariat of Health (SSA) to improve laboratory-based surveillance of dengue and dengue hemorrhagic fever, a potentially great problem for Mexico. The Centers are also interested in the prevention and control of tuberculosis at the border and on studying the influence of environmental factors on the incidence of birth defects. CDC have detailed a physician epidemiologist as an advisor to the Mexican Secretariat of Health (SSA).

An MOU between NASA and Mexico's SSA is currently being negotiated on malaria research (Project Di-Mod). This project envisages using remote-sensing technology to track the location of environmental changes congenial to repopulation of malaria vectors (Anopheles mosquitoes). Advance knowledge of where to expect such a repopulation will allow SSA to focus eradication efforts.

Environment and Global Change

Some of the best examples of close cooperation between U.S. and Mexico continue to be in environmental affairs. The 1983 U.S.-Mexico Border Environment Agreement is the mechanism by which the two countries work together in resolving a wide range of transboundary pollution issues. Of special interest to border communities are agreements concerning joint international sewage treatment plants in Nuevo Laredo and San Diego, and on air pollution in urban areas of Ciudad Juarez and El Paso. The International and Boundary Water Commission (IBWC), U.S. Environmental Protection Agency (EPA) and the Mexican Secretariat of Urban Development and Ecology (SEDUE) take the lead in these efforts.

EPA recently signed a new bilateral Agreement on Cooperation for the Protection and Improvement of the Environment in the metropolitan area of Mexico City. The new Agreement commits the U.S. and Mexico to work together to address the air and other pollution problems of one of the world's largest cities. An example of cooperation under this Agreement was a recent team visit of EPA engineers and technicians who evaluated the vehicle emission testing capabilities of Mexico's Federal District, SEDUE and the Mexican Petroleum Institute (IMP).

Joint U.S.- Mexico programs in Environmental and Natural Resources Management (E/NR) continue to expand. There is persistent high-level interest in working closely with public and private U.S. organizations in managing and preserving Mexico's natural heritage. An increasing Mexican ecological awareness has resulted in growing

U.S. Embassy contacts with U.S. and Mexican non-governmental organizations (NGOS) interested in participating in E/NR projects. The Embassy science section, USAID mission and other USG agencies are playing a greater role in Mexican conservation, preservation, and resource management projects. The AID mission increased its initiatives in environmental assistance as a result of new funding under the global climate change earmark in the FY-90 foreign assistance legislation. Approximately $1.4 million were made available in FY-90, focusing on the protection of tropical forests and biodiversity, buffer zone management and technical assistance and training in Mexico. One notable area is sea turtle conservation programs, on which Mexico is considered a model country in the region in terms of cooperation and initiative.

Energy

On July 19, 1990 the Department of Energy (DOE) and Mexican Petroleum (PEMEX) agreed to cooperate on the Mexico City Air Quality Study, a technical energy project to be performed by the Mexican Petroleum Institute (IMP), PEMEX's research arm, and DOE's Los Alamos National Laboratory. The project includes validation of models to be used to calculate the potential of influence on air quality of several energy-related mitigation options. The project will last about 33 months, and involve many researchers from both institutions and a $9 million investment, equally shared by both.

Economic Competitiveness

Mexican officials are well aware of the importance which the U.S. Government places on intellectual property rights (IPR). While the U.S. has not encountered any serious problems with the Mexican Government over IPR in S&T cooperative projects, the USG remains committed to ensuring adequate and effective protection and allocation of intellectual property in agreeements and MOUs. The Mexican Government was to present new and improved IPR legislation (addressing patent, trademark and copyright issues) for legislative consideration in late 1990.

Chapter 3: NATO

NATO

North Atlantic Treaty Organization members realized early in the Alliance's development that true security does not rest only on military foundations. A committee of "Wise Men" reported to the North Atlantic Council in 1956 that progress in science and technology would also be crucial to the future of the Atlantic Community. The result was a Task Force on Scientific and Technological Cooperation, leading in turn to a decision in December 1957 to set up a NATO Science Committee of national representatives, and a Science Adviser position (subsequently given the rank of Assistant Secretary General).

NATO embarked on a program to stimulate national development of science, encourage cooperation among allies and work with other agencies. In 1969, these activities were expanded at U.S. initiative to add the Committee on the Challenges of Modern Society (CCMS). These two programs constitute NATO's "Third Dimension." The United States has taken a strong interest both in promoting and participating in them. NATO's "Third Dimension" is a key element in general U.S. security policy. The enhanced outreach to the states of Eastern and Central Europe that was decided in both programs in 1990 will further the role of NATO's science and environment work in preserving a stable and free transatlantic community.

Basic Science

Support for basic sciences is at the core of NATO's science program. A key element is the NATO Science Fellowships Program, which receives about 50% of the annual science budget (about $11 million in 1989). The Fellowships have contributed to the training of around 20,000 scientists from Alliance member countries. The U.S. has hosted about 50% of the NATO fellows. Chemistry, biology, physics and engineering have been the principal subjects. Administration of fellowships is on a national basis, enabling national priorities to be best served; NSF is the administering agency for the U.S.

Other aspects of NATO's science program offer different kinds of support for basic sciences. The principal channels are NATO's Advanced Study Institutes (ASI), Advanced Research Workshops (ARW), and collaborative research grants. Special programs and a recently-instituted series of NATO science surveys, focusing on specific issues, complement the above. NATO currently runs 50-60

Advanced Study Institute and Advanced Research Workshops annually, involving several thousand scientists. Scientists from non-NATO countries, including persons from central and eastern Europe and the USSR, can participate in these programs. 1,055 of the 8,940 participants in 1989 were non-NATO, 265 of whom were from eastern Europe and the USSR.

ASI's are teaching activities intended to improve the general level of scientific competence throughout the Alliance. Eminent scientists present the latest work in their field to other specialists. Some ASI's are multidisciplinary, allowing participants to serve as both teachers and students. Typical subjects from the 1990 list included: "The Sun: A Laboratory for Astrophysics," "Recent Advances in Industrial Applications of Biotechnology" and "Recent Developments in Decision Support Systems." Over 1,600 ASI's have been held since the program began in 1959, with 60 in 1990. Proceedings are published (over 1,000 volumes to date) and reach larger audiences. ARW's offer occasions for groups of 20 to 40 scientists to engage in intensive discussion of a particular area - ranging from ethical issues in preventive medicine to semiconductors. The first eight ARW's were held in 1980; by the end of 1990, NATO had sponsored nearly 400. Finally, the collaborative research grants help nationally-funded projects to incorporate an international element, by funding exchange-visit travel and living expenses of research team members. 617 projects were funded from August 1989 to August 1990, bringing the total since 1960 to nearly 7,000.

NATO has a well established tradition of funding work with a particular scientific concern. In recent years these special programs have been quite specifically focused, with the intention of working on areas undergoing rapid change. Special programs in 1990 included "Chaos, Order and Patterns: Aspects of Nonlinearity," "Advanced Educational Technology" and "Global Environmental Change" (discussed in more detail under Environment). In 1990, the science program undertook a new series of special studies, cast toward the frontiers of science.

NATO also supports a special approach to the development of basic scientific capabilities in less prosperous members of the alliance, through strengthening the scientific infrastructure of those states (Greece, Turkey and Portugal). Under this "Science for Stability" program, national authorities develop projects, which involve universities, research institutes, and private industry. NATO supplements national funding; approximately $4.5 million are allocated annually.

Projects supported in 1990 included a geotech project in Greece, a multifaceted river management program in Portugal, and microelectronics in Turkey.

Health and Energy

NATO has no separate programs in these areas but much of the work in its science and CCMS programs is related to these concerns. Current examples include a collaborative research grant concerning the effects of HIV on host gene expression, an Advanced Research Workshop on three-dimensional imaging in medicine, and an Advanced Study Institute on asthma treatment. The CCMS program has conducted pilot studies on solar and geothermal energy, and on rational energy use.

Environment

CCMS brought NATO into the field of environmental concerns and is the locus of NATO's principal environmental role. CCMS has now completed twenty years of promoting practical approaches to the improvement of the quality of life in NATO countries. Its approach relies on resources and experience of Alliance members rather than on creating new research bureaucracies.

CCMS promotes intra-alliance cooperation on environmental issues through its innovative Pilot Studies Program. Over three dozen studies have been completed, and twenty-two were underway in late 1990 with several others awaiting approval. (These figures compare to a total of 35 over the first 20 years.) The pilot studies are fully reported through the CCMS publication series.

A small program of fellowships is available to assist individuals to attend CCMS pilot study meetings. Not every ally participates in every study, but the results are available to all. Pilot studies are intended to help policymakers and stimulate action. There is followup after a study is concluded to ensure that action does occur. Such measures help make the CCMS approach uniquely valuable. The CCMS program also offers an important means of ensuring that the environmental expertise of Alliance members can be shared with Central and Eastern European states.

CCMS also sponsors periodic seminars on the relation of defense activities to the environment. A recent one addressed aircraft noise. The NATO science program has since its outset sponsored numerous activities related to environmental issues. Examples over the last year include an ASI held in Turkey on industrial air pollution, and a collaborative research grant on "Ozone and Ultraviolet Studies at High Latitudes." A recent initiative is the Special Program on Global Environmental Change, launched in mid-1990.

National Security

The NATO science and CCMS programs do not conduct defense research. They are based on the NATO treaty's concept that security ultimately rests on free societies. That concept was amplified in a 1956 report of NATO's Committee on Non-Military Cooperation. That report's finding that progress in science and technology can be key determinants of the security of nations continues to be the basic rationale for NATO's science cooperation. NATO countries' national defense establishments have contributed to this cooperation. They are active in the CCMS program, whose pilot studies in 1990 included examinations of the environmental damage caused by military activities, and applicability of national environmental expectations and requirements to NATO activities. DOD is a co-pilot of the latter study.

The decision of the NATO Science Committee to expand its cooperation with scientists from central and eastern Europe and the USSR had a clear security component. The United States took an active role in formulating the Science Committee's initiative.

Poland

As with virtually every other aspect of Polish life, the S&T sphere is going through a period of uncertainty as old institutions are changed or abolished and new ones debated and put into place.

Basic Sciences

Central to changes in the science field is an effort to restructure the system for financing research and development in Poland by transferring funding control from the Polish Academy of Sciences (PAN) to a semi-autonomous National Research Council. The council, which will replace the present Office for Science Progress and Application (Urzad Postepu), will channel research funds directly to scientific institutions and university laboratories without the involvement of ministries. Greater emphasis will be placed on self-financing of research by individual enterprises, and on competition for funds. The National Science Foundation (NSF) is assisting in this changeover by advising Polish authorities on operation of a peer review grant system to replace the present, highly centralized one.

Close cooperation between the United States and Poland in the promotion of basic scientific research continued in 1990 under the umbrella of the Maria Sklodowska-Curie Joint Fund II (MSC II). The fund, established as a result of an agreement signed by then Vice-President Bush in September 1987, presents opportunities for Polish scientists to collaborate with U.S. scientists in a broad range of research activities. In 1990, the U.S. contributed $1.275 million to the fund, up from $600,000 in 1989, the first year of operation. The Polish government matches all U.S. contributions in zloties.

In its April 1990 meeting, the U.S.-Polish Joint Commission for Science and Technology approved continuation of a three-tiered approach to research priorities and funding allocations for MSC II cooperative activities by priorities as follows:

First - agriculture, environmental protection, medical science and health protection, basic research and engineering research (70 percent of fund total);

Second - geoscience research and exploitation of mineral resources, and energy research (20 percent);

Third - transportation, construction research, oceans and atmospheric sciences and limnological (lakes, ponds and streams) research, parks management and historical preservation, and fish and wildlife conservation (10 percent).

Among some of the topics approved for MSC II funding in 1990 were:

- Health Projects - clinical epidemiology of parasitic diseases, iron status in women of childbearing age, epidemiology of insulin dependent diabetes mellitus;
- National Science Foundation projects - polymer microstructure, hadrons;
- Energy projects - pyrolysis desulfurization of coals;
- NOAA project: analysis and modeling of multispecies resources;

- Environmental project: anerobic-aerobics for low concentrated waste waters;
- Bureau of Mines project: mine coal dust explosion control.

Health

Improving public health conditions in Poland is a priority challenge for the government. An estimated 50% of Poles live in a substandard health conditions environment. Excessive toxic substance levels present an immediate health threat in areas of the country inhabited by about 12 million people, about one third of Poland's total population. 20% of Poland's employed work in conditions of immediate health hazard. Polish morbidity and mortality rates and life expectancy are among the worst in Europe. In most industrial areas there is increased incidence of respiratory diseases among children. Recently a dramatic increase in male mid-life sudden deaths has been registered.

Poland's health care system has been unable to cope fully, partly because of lack of adequate investment over the years and partly because of flight of grossly underpaid health services staff (especially nurses) in search of better paid jobs in other sectors. As a partial corrective, salaries of health care workers were recently linked to pay in the production sectors.

A new national health program is being formulated to address the problem of the overall breakdown in delivery of health care. A principal goal is to move health care from a budgetary to a health insurance system.

Environment

Poland continues to rank as one of the most polluted countries of Europe. Sulphur dioxide emissions per square meter are four to eight times higher than in Western Europe. An estimated 95% of surface waters are unfit for human consumption because of household sewage and industrial pollution. A quarter of Poland's cities and the majority of rural areas experience permanent or temporary water shortages. Half of all cities, including Warsaw, and 35% of industrial facilities have limited or no waste water treatment systems.

To underscore the U.S. commitment to Poland in addressing some of these environmental problems, EPA Administrator William K. Reilly paid an official visit to Poland September 7-9, 1990. During his visit U.S. assistance efforts were reviewed and additional measures announced. These included a special EPA appropriation to help in efforts to preserve the Mazurian Lakes area and for establishment of an energy efficiency center. Three major U.S. environmental initiatives, announced by President Bush during his Eastern European visit in July 1989 and totaling $15 million are presently underway in Poland. The initiatives are concentrated in Krakow, the magnificent medieval city designated by UNESCO as a world monument but suffering from severe pollution. They include a $10 million retrofit of an existing coal-fired power plant, the Skawina Power Plant, with advanced clean coal technology which will reduce SO2 emissions by at least 70%; $1 million for an air monitoring network; and $4 million for measures to improve water quality (pollution reduction, recycling, low-cost effluent treatments).

An additional $20 million is authorized to assess and develop the capability within Poland to manufacture equipment that will enable industrial facilities in the country to burn fossil fuels cleanly.

The World Bank, convinced that adoption by Poland of an appropriate environmental strategy should be an integral part of its economic reform process, recently approved an $18 million loan for an environmental management project. The project will provide a framework for addressing Poland's highest priority environmental concerns, and for moving toward a decentralized system of environmental management. The overall goal is to promote an institutional, regulatory, and informational basis for reducing health risks, decreasing economic costs from environmental degradation, and improving environmental quality.

It is becoming increasingly recognized by Polish officials that many of the environmental problems facing the country can be definitively solved only through cooperative regional action. 14% of sulphur dioxide depositions in Poland originate in Czechoslovakia and Germany. On the other hand, Poland is the largest polluter of the Baltic sea. The Polish government is working closely with neighbors on these problems. For example, it actively participated in the Ministerial Conference on Baltic Sea Pollution, in Sweden in September 1990, which initiated work on a comprehensive management plan for the Baltic.

Poland pledged firm support for the newly-established Regional Environmental Center for Central and Eastern Europe. As evidence of this commitment, Environment Minister Kaminski personally headed the Polish delegation to the Budapest ceremonies marking the opening of the center in September 1990. A Pole, Dr. Janusz Kindler, Director of the Institute of Environmental Engineering at Warsaw Technical University, was elected chairman of the Center's board of directors. Poland hopes to carve out special responsibility for energy efficiency in the framework of the regional center.

Poland is also increasingly active in global environmental efforts. It ratified the Vienna Convention and the Montreal Protocol in June, 1990. It played an important role in the Bergen Conference on Environment and Development, and has been named vice-chairman of the UNCED conference in Brasilia in 1992. Deputy Prime Minister Jan Janowski was a major participant in the April 1990 White House Conference on Science and Economics Research Related to Global Change in Washington. Poland has also been an active player in the Inter-governmental Panel on Climate Change (IPCC) process.

Energy

Poland is the largest producer and consumer of energy in Eastern Europe. Coal, the principal source of its energy, accounts for about 80% of power consumed in the country, compared to 24% for Europe as a whole. The Polish coal industry is extremely inefficient, consuming 20% of all steel used (e.g., for structural supports in mines) and 10% of all electric power. Moreover, the universal use of coal for home heating and lack of conservation incentives are major factors in Poland's pollution. Since shifting to oil or gas is not likely to be practical in view of Polish trade balance constraints, development of clean coal technologies for small boilers and furnaces may be a cost effective approach for Poland in both controlling pollution and conserving energy.

Poland has given up the nuclear power option, at least for the present. In September 1990 the Council of Ministers voted to abandon construction of the Zarnowiec nuclear power plant, effectively ending nuclear power in Poland until after the year 2000. Zarnowiec would have been Poland's first nuclear power plant. The study which led to this decision recommended that development of nuclear power be delayed until after the year 2000, and that nuclear power be used thereafter only to a limited extent. The Zarnowiec plant had been the object of intense public opposition from environmental groups. The project, started in 1982, was based on Soviet technology, and reportedly cost about a billion dollars before construction was halted.

Economic Competitiveness

Forty years of a command economy damaged Poland's environment, thwarted technological development and fettered the science establishment. It is unlikely that the economic restructuring of Poland can be successful in the long run without a major effort to solve Poland's environmental pollution problems. Losses due to pollution of the environment are estimated at 15% of GNP. Only sustainable development over the long term can create the conditions for environmental and scientific renewal. For the immediate future, manufacture of desulfurization equipment and investments in conservation technologies and coal preparation processes (along with telecommunications) are likely to be prime growth areas in Poland's economic development.

Spain

Spain's economic growth, stimulated by domestic and foreign investment, has been the highest in the European Community since Madrid's 1986 accession to the EC. Manufacturing, including high-tech aircraft, computers, chemicals, instruments, and telecommunications equipment, rose over 25% in 1989. U.S. exports to Spain rose 14%, featuring aircraft and parts, computers, and machinery.

Basic Sciences

The Spanish government has a substantial budget for S&T research, sends large numbers of scientists and science students to do research and study in the U.S., and is an active participant in leading European multinational research programs. In preparation for the 1992 EC single market, Spain's national science plan envisages increasing R&D expenditures (government and private) to one percent of GDP, up from 0.85% in 1988. (1990 GDP was about $500 billion.)

In playing S&T catch-up, Spain looks to programs of the EC as a main motor for progress; 5% of its total R&D budget goes to EC programs such as Framework and ESPRIT. Slightly over 7% of Spain's R&D budget is earmarked for the European Space Agency (ESA) and the Airbus program. The Spanish share of ESA's contribution to Space

Station Freedom is 6%, more than some larger countries'. Spain supports 3% of the ESA Ariane 4 rocket, more than Sweden, Denmark, the Netherlands or Ireland.

Official U.S.-Spain S&T cooperation entered a new phase with the separation of such cooperation from the new military base agreement that went into effect in 1989, and the end of U.S. Economic Support Funding (ESF) for joint S&T. The joint secretariat which formerly administered an annual $7 million S&T program funded by ESF was disbanded in December 1989. The U.S. and Spain are negotiating for a new cooperative agreement that will permit joint funding for projects of mutual benefit and will protect rights to intellectual property developed under its auspices. Some areas of interest under the former agreement continue to receive joint support from individual U.S. agencies, notably in basic science, aeronautics, and agriculture. Meanwhile, there has been extensive private sector investment by U.S. high-tech firms (e.g., Du Pont, IBM).

Environment

Despite formation in 1990 of a general secretariat for environment in the Ministry of Public Works and Urban Development, environmental protection remains fragmented in Spain among several ministries. Spain is the only EC country without a single centralized environmental authority. It is in the process of bringing its environmental laws and regulations up to EC standards but the process is still incomplete.

Internationally, Spain tends to adhere to EC positions on subjects such as climate change. Spain hosted the 1990 CSCE meeting on protection of Mediterranean ecosystems, focusing on pollution of the sea, desertification, deforestation and the environmental impact of tourism. The Spanish are very concerned about desertification in southeastern Spain and have sought EC funding for conservation efforts. Dealing with the results of past environmental neglect and meeting EC norms for environmental protection will inevitably spur scientific interest, activity, and cooperation in this inherently international field.

Energy

Spain augments native coal, erratic hydroenergy and imported gas and oil with 7000 megawatts of nuclear power from nine plants. (Spain closed an older 500-megawatt plant in October 1989 after a fire.) Nuclear energy accounts for 38% of Spain's electricity. Increased energy at a rate of perhaps 1000 megawatts capacity per year is needed for Spain's growing economy. Nonetheless, popular and political opposition to nuclear power has led to a moratorium on new construction. Completion of four partly-built plants has been blocked, and no new plant has been opened since 1988.

Cooperation with the United States continues in the areas of nuclear safety and coal technology. Legal complications in U.S.-Spain nuclear cooperation eased with Spain's accession to the nonproliferation treaty in 1987. Harmonization of U.S.-Spain nuclear agreements predating Spain's EC entry with those between the U.S. and Euratom is an ongoing task.

United Kingdom

S&T relations between the U.S. and the U.K. remain extensive and close at all levels, governmental, institutional and individual. Interaction between scientific societies of both countries, frequent exchanges between governmental institutions, and fruitful industrial relationships are continual. While a number of topical or project-related memoranda of understanding have been concluded over the years between counterpart agencies of the U.S. and U.K. governments, there has been no perceived need for an umbrella science and technology agreement.

Basic Sciences

HMG recognizes that both economic progress and sustained national security can depend significantly on the health of a national science program. It is therefore increasingly involving the state in the support and direction of basic and applied science. To emphasize further its commitment to promoting science, the government has instituted a compulsory course in science and technology for students up to age 16.

While much of both basic and applied research is supported through individual government departments, support is now being coordinated through a high level advisory council, chaired by the prime minister. Government S&T support is divided into broad-based funding given directly to universities, and support administered through the Science and Engineering Research Council (SERC) for commercially exploitable technologies. The universities receive block funding from the Universities Funding Council (UFC), which supports both research and scholarship across the whole spectrum of knowledge. The SERC splits its assets between university research and support for its own research facilities.

Each of the various entities that perform research have a certain component of their effort invested in international activities. By this means, HMG remains involved in large-scale science such as space exploration, high energy physics, and global climate research.

Health

The great bulk of U.K. medical research is conducted by either the research facilities of the Medical Research Council (MRC) or university medical schools under MRC grants. Of special importance are MRC's three largest institutions: The National Institute for Medical Research, the Laboratory of Molecular Biology and the Clinical Research Center. All medical research is overseen by four research boards, which assess progress and appraise proposals on the basis of regular reports from research teams and visiting expert subcommittees. The MRC budget consists of four areas: biomedical research, AIDS research, health services research, and training grants. The U.K.'s AIDS research program, directed primarily at vaccine and drug development, now consists of some 150 individual projects. Beginning in 1989, the MRC earmarked funds for human genome mapping. It is also the principal HMG entity involved in the EC's Human Genome Analysis Program, established this year.

Environment and Global Change

Former Prime Minister Thatcher's speech before the Royal Society late in 1988 signaled heightened U.K. concern about environmental issues. As a consequence, international collaboration in environmental research has taken on growing importance for the U.K. Specific international programs include: work on ozone layer depletion, study of the oceans' absorption of carbon dioxide; the world ocean circulation experiment assessing the role of the ocean in modifying the earth's climate; global atmospheric modeling to understand climate change; and the analysis of data from the European Remote Sensing Satellite, measuring such items as ocean wave heights, surface temperatures, and surface winds.

The U.K. is playing a key part in the Intergovernmental Panel on Climate Change. With regard to ozone layer depletion, the U.K. is committed to phasing out CFC's by the year 2000 and is examining ways to advance that date to 1997. It also will contribute 9.5 million pounds to help developing countries meet their commitments to use environmentally benign alternatives to CFC's. On global warming, the Prime Minister has announced that, if other countries take similar action, the UK will stabilize greenhouse gas emissions at 1990 levels by the year 2005. The present White Paper on the Environment notes that when all U.K. actions on these gases are taken into account, the global warming potential of Britain's emissions should be 20% less than in 1990. Other U.K. environmental priorities include tightening controls over vehicle emissions, improving water quality, setting higher standards for hazardous waste incineration, and strengthening international efforts on tropical forestry.

Energy

A principal UK focus has been on increasing energy generation and use efficiency. Past efforts have paid off, as the U.K.'s 1989 GDP was 25% higher than 1979 without using more energy. Among measures announced in a recent environment white paper on energy efficiency were: tougher building regulations, emphasis on using gas to reduce sulphur emissions, combined cycle fuel for power generation, greater use of combined heat and power (CHP) technology, energy efficiency labelling, and speeding development of renewable energy sources including wind, hydropower, tides, burning of dry wastes and use of biofuels.

While the government is privatizing the electricity industry, the U.K.'s nuclear power stations, which generate approximately 20% of the country's electricity, will remain in the public sector. The British government has been a consistent proponent of nuclear power for both environmental and energy-security reasons. HMG wishes to retain the nuclear option, but wishes for nuclear power to become more economic, and wants the nuclear industry to demonstrate that it can maintain high standards of safety and environmental protection.

Economic Competitiveness

HMG recognizes that the continued economic prosperity of the United Kingdom depends critically on the extent to which, in the face of intensifying international competition, it is able to achieve and maintain technological leadership. HMG believes that the government's responsibilities extend to basic and strategic research, but do not include the development of specific products or processes for commercial gain, which is considered the responsibility of the industrial sector. However, the U.K. has increased its efforts to foster cooperation among government institutions, universities and industry on technologies that are commercially promising. The goal of the U.K.'s system of public support is to encourage freedom of inquiry into speculative and innovative research, and to combine this with targeted support on the most economically promising ideas, before passing responsibility for further development on to the private sector.

One of the most difficult but necessary tasks is to identify which areas hold the most promise. A significant HMG report recommended that the UK establish a process for drawing together relevant knowledge and for changing both public and private priorities for research support in line with resulting assessments. These were rationales underlying establishment of the U.K.'s Advisory Committee on Science and Technology (ACOST) and Center for the Exploitation of Science and Technology (CEST). ACOST continues to advise the government on S&T priorities, assisted by CEST.

HMG has to date established 21 interdisciplinary research centers for specific technologies, most of which are housed at various universities. A goal is to establish some 40 such centers over the next few years. The UK has also established a series of so-called "link" programs. The link initiative provides a mechanism by which the public sector in the form of research councils and government departments joins with private sector companies to pursue agreed research programs. While the majority of future fields are likely to be in engineering, a significant number will be in areas of science. Further to motivate transfer of ideas, HMG has taken steps to provide initiating organizations with intellectual property rights for their creative accomplishments.

National Security

Of the 4.5 billion pounds spent by HMG on research and development, some 2 billion are devoted to defense. The Ministry of Defence's (MOD) research program is undertaken in MOD establishments and as funded research in industry, research institutes, and the universities. Approximately 40 percent is carried out "extramurally," principally in industry. Non-nuclear in-house research is conducted by five MOD research establishments: Admiralty Research, Royal Armament Research and Development, Chemical Defence, Royal Aerospace, and Royal Signals and Radar. Collaboration with the U.S. on defense-related research and development is extensive, including the MOU on the Strategic Defense Initiative (SDI) signed in 1986.

Cooperation and coordination between the U.S. and the U.K. continue to be extremely close in the areas of nuclear and missile proliferation. Annual bilateral consultations on these issues, which include sharing information on sensitive transactions, are reinforced by almost daily interactions by the respective Embassies on a wide range of nuclear and missile topics.

USSR

The Soviet leadership has moved to intensify cooperation in science and technology agreements with the West. President Gorbachev hopes that the recent scientific agreements and accords signed at the Washington Summit with President Bush will add impetus to broadening the scope of cooperation between the United States and the USSR. Motivation for much of this increase is more economic and political than scientific; the Soviets frequently reiterate their desire for U.S. bilateral cooperation as one means to help restructure their society.

Bilateral S&T activities have been increasing significantly. The Science Office of the U.S. Embassy in Moscow counted 44 related groups of American visitors in the month of July 1990 alone; there were another 40 in September. However, there will be at least procedural bumps in the road ahead. Increasing decentralization of the USSR, growing importance of the Republics, and ongoing restructuring of most government organizations, and the Soviet Academy of Sciences, complicate matters by making lines of authority markedly fuzzier.

Such factors are making practical arrangements more difficult for visiting delegations (and their Soviet sponsors) on such matters as visas, travel arrangements, logistics and hard-currency requirements.

Basic Sciences

U.S.-Soviet basic sciences agreements expanded in 1990. Cooperation under the 1989 Agreement for Cooperation in the Field of Basic Scientific Research was broadened to include U.S. and Soviet university and institute scientists and engineers. The two sides held this Agreement's first joint commission meeting in April 1990 in Washington. The meeting reviewed existing cooperation between NSF and the Academy of Sciences of the USSR and between the U.S. Geological Survey and the USSR Ministry of Geology; agreed to expand and encourage contacts among scientists; and included an exchange of views on science policy in both countries. The NSF and the ASUSSR also reported the addition of two new topics to the existing NSF-ASUSSR Memorandum of Understanding: scientific and engineering foundations of earthquake engineering and hazard mitigation, and arctic social science research. Expansion of the Agreement into further areas is being explored.

Under the Agreement Concerning Cooperation in the Exploration and Use of Outer Space for Peaceful Purposes, in October 1990 NASA hosted the fourth annual meeting of the U.S.-USSR Solar System Exploration Joint Working Group. Among several areas covered under this Agreement are:

- coordination of Mars observer and Mars 1994 missions and the exchange of scientific data resulting from them;
- exchange of participating scientists in the Mars mission; Mars landing sites implementation team discussions;
- data exchange on the exploration of the Venusian surface; and
- discussion of flight instruments such as Mars balloon relay and Antarctic balloon experiments/gamma-ray spectroscopy. NASA Administrator Admiral Truly's October 14-19 visit underlined both sides' desire to continue and deepen this cooperation.

Other 1990 initiatives from Moscow included proposals for discussions of: further "big science" cooperation in space, genome deciphering and nuclear power safety and waste disposal; a joint Soviet-American (or Russian-American) university; agreements that would allow Soviet organizations to contract out research tasks to U.S. firms and to accept research contracts from U.S. organizations; and increased exchanges of high-tech scientists, engineers and managers.

Intellectual property protection continues to be a question in cooperation between the U.S. and the USSR. In the past problems were solved on a case-by-case basis under each individual cooperative agreement. The most recent Soviet draft law on inventions and inventive activity, completed in April 1990, provides patent protection for most inventions but does not cover computer programs. A revised draft was presented on July 1, 1990.

Because the recent trade agreement signed in Washington between Presidents Bush and Gorbachev includes intellectual property provisions, the USSR inventions law may undergo further change before going into effect. Article VIII of the trade agreement mentions "protection of intellectual property" and requires both countries to provide copyright protection for computer programs and databases.

Health

Numerous exchanges emerged in the past year under the auspices of the U.S.-USSR Health Agreement. New fields ranged from studies on alcohol abuse and drug dependence to AIDS research, with particular attention to environmental health concerns. High-level discussions took place on cooperation in the areas of cancer research and cardiopulmonary disease, with the intention of expanding joint clinical trials, cooperation in basic research, and opportunities for training of Soviet scientists in the U.S. Numerous small-scale exchanges occurred on the working level.

Environment

The United States and the Soviet Union continued to develop cooperative efforts in environmental protection on three levels this year: Presidential dialogue on mutual environmental concerns at the Summit; new projects providing for collaborative research at the working level (such as possible studies on water contamination in the Ukraine), and an increasing number of contacts among non-governmental organizations involved in environmental protection.

At the summit and ministerial levels, global environmental issues became a prominent agenda item. Presidents Bush and Gorbachev expressed support at the June 1990 Summit for expanding cooperative research in environmental sciences, and proposed the establishment of a jointly-administered park in the Bering Sea region. In addition the U.S. and USSR are participating in the drafting of a framework convention to coordinate international responses to global climate change, to be completed for the 1992 United Nations Conference on Environment and Development.

The U.S.-USSR Agreement on Cooperation in the Field of Environmental Protection continues to thrive. This agreement facilitates joint research in twelve areas, including prevention of air pollution, protection of arctic and sub-arctic ecological systems, and legal measures for protecting environmental quality.

In 1990 the U.S. and USSR governments signed a new agreement on cooperation in world oceans studies. Topics include research in ocean-atmospheric joint interaction, ocean current and dynamics, geochemistry and marine chemistry of oceans, geology and geophysics of world oceans, biological productivity, and intercallibration of oceanographic instruments and methods. The two sides held the first Joint Committee meeting of the Oceans Agreement in Moscow in September 1990.

Increased U.S.-USSR environmental cooperation is emerging among non-governmental organizations. Together with obtaining basic necessities of life, environmental degradation is a major focus of concern for Soviet citizens. American environmental activists have contributed to the Soviet environmental process by sharing their experience with Soviet NGO's and by jointly promoting energy conservation, establishing bilateral programs in environmental education, and producing joint publications.

Energy

At their June 1990 Summit, Presidents Bush and Gorbachev renewed the U.S.-USSR Agreement on Cooperation in the Peaceful Uses of Atomic Energy; it is in effect for five years. Cooperation has continued under the Agreement on (magnetic confinement) Fusion, Fundamental Properties of Matter, and Civilian Nuclear Reactor Safety. In addition, the U.S. Department of Energy and the USSR Ministry of

Atomic Energy and Industry concluded a Memorandum of Cooperation in environmental restoration and nuclear waste management; cooperative activities have already begun.

In mid-1990 a U.S. fact-finding team visited the USSR to explore possible cooperation in non-nuclear areas, including fossil energy, energy information, conservation and renewables, and in other areas. At present, cooperation is moving forward with proposed scheduling of a seminar and perhaps workshops in this area, which will include major participation by American private sector firms from the energy arena.

National Security

At the May/June Washington Summit meeting between Presidents Bush and Gorbachev, a joint statement was issued laying out agreed principles on non-proliferation of nuclear and chemical weapons and missiles capable of carrying such weapons. The U.S. and the USSR declared their commitment to preventing the spread of such weapons, and agreed to work closely together and with other members of the international community to develop and put into action concrete measures against such proliferation. In 1990, the U.S. and the USSR held the fourteenth round of regular bilateral consultations on nuclear non-proliferation since 1982. Delegates to the meetings conducted a comprehensive and detailed exchange of views on ways to improve nuclear export controls, mechanisms for increasing support for the Non-Proliferation Treaty, strengthening International Atomic Energy Agency nuclear safeguards, and discussions of regional non-proliferation issues.

Yugoslavia

Yugoslavia has been considered a leader among other central and eastern European countries in most scientific fields of special interest to the USG. Yugoslav policymakers, administrators and scientists have recognized the importance of cooperation to be able to draw on international sources in order to attain national strategy goals.

U.S.-Yugoslav scientific and technological cooperation under the 1988-1993 bilateral S&T agreement continues to be productive and flexible. Twelve U.S. Government agencies, 10 of which have more than a decade of experience with Yugoslavia, have developed relationships with a network of highly qualified and internationally known Yugoslav scientists and institutes. At its latest meeting, the U.S.-Yugoslav Joint Board approved 61 new projects, in addition to about 240 ongoing research grants that have uniformly received high ratings for their scientific merit and for their relevance to U.S. research programs.

Fiscal Year 1990 was a transitional year for Yugoslavia, with free elections at the republic level giving new rise to democratic institutions and multiparty politics. Along with this, new interest has been reflected in environmental concerns, particularly concerning the safety of Yugoslavia's sole nuclear reactor. Yugoslav federal and republic level institutions with which USG agencies have dealt effectively for nearly 20 years continued to function with little disruption to joint research.

Basic Science

Yugoslav centers in Belgrade, Zagreb and Ljubljana are particularly strong in physics, chemistry and biochemistry. Basic science is part of Yugoslavia's national strategy to develop technologies such as microelectronics, computers, telecommunications, flexible production technology, and robotics. The U.S.-Yugoslav S&T cooperation agreement represents a vehicle that has been able, to mutual benefit, to fund projects in the fields of great interest to U.S. Government agencies such as robotics, flexible manufacturing, and superconductivity.

Health

The U.S.-Yugoslav S&T cooperation agreement finances some 40 basic science/fundamental research projects. About 10% of the jointly funded projects are related to health research that, *inter alia*, pertains to AIDS (chlamydia trachomatis), cancerogenesis, DNA polymerases, etc., and is highly relevant to U.S. National Institutes of Health objectives. Proposals for research in developmental aspects of self-medication and addictive drug abuse, drug abuse prevention and treatment are pending availability of funds.

Environment

In the region, Yugoslavia started early to address specific environmental fundamental research issues. Its environmental strategy includes 36 national projects on issues such as air and water pollution, global climate change, pesticide/herbicide impacts on agro-ecosystems, and hazardous waste management and disposal. Although national in essence, the strategy recognizes that environmental issues are of global interest and that knowledge and costs of addressing them will have to be shared. Most of these projects will seek World Bank, UNEP, USAID, EPA and other U.S. technical agency support.

Working with USDA, USDOE, EPA, NSF and recently NOAA through the S&T agreement's Joint Board, a highly qualified core of bench scientists in Yugoslavia is addressing problems of dry land farming (developing drought-resistant genetic material), pesticide/herbicide impacts on the environment, parameterization of vegetation for metereological models, clean coal technologies and great lakes research (Skadar Lake). The Joint Board is presently supporting several workshops to identify and develop more programs of interest to the U.S. and globally. Yugoslavia is also represented on the new Budapest Regional Environmental Center's Board of Trustees, and plans to take a lead by hosting off-site workshops sponsored by the center on topics where Yugoslav scientists have special expertise.

Energy

With the rising cost of energy supplies and in view of the environmental impact of energy use, Yugoslavia's strategic plans include optimization of natural sources for better production of energy (water, wind and solar), clean coal technologies, and energy efficiency and conservation issues. To achieve these goals, both national and republic government structures are seeking bilateral, multilateral and other forms of international cooperation. The most recent related effort of the U.S.-Yugoslav Joint Board was to fund two workshops on energy efficiency and conservation. These may lead to discussions regarding possible organization of a Regional Energy Efficiency Center in Yugoslavia to cover central and eastern Europe.

Chapter 4

CONCLUSIONS AND RECOMMENDATIONS

The contents of this Title V report support two over-arching conclusions:

1) International S&T cooperation is more germane than ever to U.S. foreign policy and the advancement of science, and

2) in the post-Cold War era U.S. participation and leadership in international science and technology must continue.

The following is keyed to the text of Title V (in Chapter 1).

1. Personnel requirements, standards and training

It is increasingly apparent that human resources are key, if not determinant, to our S&T enterprise generally; this is specifically true in our efforts to integrate all U.S. interest, including foreign policy, with international science and technology matters. It is necessary to blend many individual human capabilities - S&T knowledge, economic, security and foreign policy skills, foreign language and cultural expertise - to achieve success in the many areas addressed in this report. These skills are necessary among people in the U.S. Government agencies involved, including the technical agencies, the Department of State and U.S. embasssies, and White House offices.

It should be noted that, especially for U.S. embassy science officers abroad, science expertise *per se* is not enough. Such assignments require expertise in, or at least an aptitute quickly to grasp, broad foreign policy considerations and their relationship to S&T. Managerial experience and/or aptitute and communications skills are also essential. U.S. science officers abroad must field a variety of tasks: conduct traditional diplomacy through demarches, representations, and reporting of host government positions and attitudes; develop and cultivate local governmental and non-governmental S&T contacts and manage sometimes quite large U.S. Government science and technology programs.

The Department of State plays a key role in the operational supervision of science and technology agreements. The Department of State coordinates the interagency process of authorization to negotiate and conclude agreements (Circular 175). The Department of State also coordinates international science and technology activities by chairing the interagency Committee on International Science, Engineering and Technology (CISET) under the OSTP-chaired Federal Coordinating Council on Science, Engineering and Technology (FCCSET), and by chairing the Policy Coordinating Committee for International Oceans, Environment and Scientific Affairs (PCC/OES) under the auspices of the National Security Council. The Depatment of State coordinates and drafts this annual Presidential report.

Recommendations

- Through its recruitment, training and assignment policies, the State Department should continue its efforts to attract top Foreign Service, Civil Service and outside scientific and technical professionals for science and technology-related careers in the Department and Foreign Service and for temporary assignments in Washington headquarters and U.S. embassies.
- Persons from outside the Department of State who are assigned as U.S. embassy science officers should possess talents and aptitudes in a wide range of areas as outlined above.
- The Department of State should continually review the role of science officers in embassies to determine more precisely recruitment and training requirements.

2. Continuation and broadening of present science and technology agreements and activities

The preceding chapters have detailed the scientific and technological benefits and foreign policy aspects of a vast range of U.S. international science and technology agreements and activities. The U.S. has been the source of much technical progress in other countries through generously sharing scientific and engineering discoveries. The U.S. still leads in many respects, but is now also on the receiving end. Given the rapid diffusion and sharing of advanced technology around the world, the U.S. cannot afford less international S&T interaction.

Recommendations

- American diplomacy must maintain and broaden extensive U.S. science and technology cooperation with the rest of the world.
- American diplomacy must work to insure that countries where new discoveries are being made open their laboratories and

scientific literature to Americans, and protect American intellectual property rights (IPR) when they derive benefits from cooperation.

- U.S. international science and technology agreements should be designed, and performance under them monitored, as to their relevance and contribution to the advancement of science and technology and to U.S. foreign policy.
- As Congress has recommended, Executive agencies should negotiate science and technology agreements with due consideration for factors such as effective provisions on equitable access and intellectual property rights.
- The performance of agreements should be closely monitored to observe implementation of undertakings on equitable access and IPR.

3. Funding

The President's budget sets forth the funding proposals, by department, for support of scientific and technological programs of the U.S. government. In this Title V report, specific program funding, for example in Poland, Hungary, Yugoslavia, Israel and India, is discussed.

Recommendations

- The Committee on International Science, Engineering and Technology (CISET) should continue to encourage transparency and consistency by technical agencies in providing funding data on cooperative S&T activities, for inclusion in this report.
- Technical agencies and the Executive departments should continue to participate in identified and specific joint efforts to prioritize and coordinate S&T activities. An example of accomplishment of this is the ground-breaking U.S. Global Change Research Program (GCRP), and analogous efforts are now underway in the areas of science and engineering education and in high performance computing.

4. Plans for future routine evaluation of science and technology agreements and activities

The intent of this and future Title V reports is to be the basic annual government reference on U.S. Government's international agreements on science and technology. With that in mind, the overall approach of this year's Title V report has been to:

- Review major international S&T activities and agreements, and
- Illustrate where and how U.S. foreign policy has been involved.

This year's report continues the past practice of providing database listings of all U.S. science and technology international agreements currently in force, according to information available to the Department of State.

Recommendations

- Future Title V reports should continue to improve the quality and usability of the data provided, in order to constitute the principal annual body of information for analysis of the foreign policy implications and the scientific and technological benefits of international U.S. science and technology activities and agreements.
- The Congress and other users of this report are requested to provide information on the usefulnesss of this report.

5. Equity of access

As detailed in the narrative, the Executive Branch has addressed the issue of equitable access in a number of international S&T negotiations and activities.

Recommendations

- As with IPR, American diplomacy should continue to work to assure equitable access, including duly-negotiated provisions in international agreements.
- Performance of agreements and S&T activities should be closely monitored as to implementation of equitable access.

Appendix I

Database

Summary of U.S. International S&T Agreements by Country

Explanation of Database:

The information in the following database is intended to provide an overview of international cooperative activities in science and technology between government agencies of the United States and their counterparts in other countries. Appendix I derives from information on hand in the Department of State and provided it by other Federal agencies and offices. It is as complete as such information permits. In some cases, agreements have technically expired, but are included herein if renewal is pending or if activities under the agreements continue.

For the most part, the items listed in the database are at the Memorandum of Understanding level or higher; however, information for some additional activities was included, based on their scope. In some countries there may be other activities (described in Chapters 2 and 3) outside of agreements described here.

"Country"designates the cooperating foreign nation. "Multilateral" and "regional" are designations assigned to activities conducted with more than one country.

"Agency" refers to the United States government agency which serves as the lead agency to the agreement.

"Entry Into Force" (EIF) and "Termination Date" (Term Date) indicate start and end times of agreements. Agreements renewed with no significant alterations usually retain the original EIF date. Agreements with no termination date have an indefinite term.

ARGENTINA

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 09/24/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through life of Landsat-4 and Landsat-5. Funds not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 12/29/87 **TERM DATE:** 12/29/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 08/01/72 **TERM DATE:** 08/01/92
REMARKS: Supports collaborative research, workshops, and short-term planning visits. Funding not specified.

AGENCY: NSF **SUBJECT:** Environment
EIF DATE: 06/19/89 **TERM DATE:** 06/19/91
REMARKS: Ozone in the upper atmosphere study. Funding not specified.

AGENCY: U.S. GOV. **SUBJECT:** S&T Cooperation
EIF DATE: 08/11/72 **TERM DATE:** 08/11/92
REMARKS: Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 05/20/81 **TERM DATE:** 11/17/91
REMARKS: Program of mutual benefit in agricultural technology, animal health (foot-and-mouth disease), plant health, pest control, agricultural economies, forestry and soil conservation. Funding not specified.

AUSTRALIA

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 03/13/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOD **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Australia and U.S. Navy. Concerns high yield and strength low alloy steels. Defense Record No. 417. Funding not specified.

AGENCY: DOD **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement with USAF, waiting for Australian signature. Provides real systems with which global, distributed operating systems can be evaluated and further developed. funding not specified.

AGENCY: DOD **SUBJECT**: Behavioral Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement - DEA. Involves Australia and USAF. Concerns psychological R&D. Defense record No. 130. Funding not specified.

AGENCY: DOD **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement - PA. Involves Australia and USAF. Concerns fibre composite materials properties. Defense record No. 137. Funding not specified.

AGENCY: DOD **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-PA. Involves Australia and U.S. Air Force. Concerns advanced aircraft materials and structure. Defense Record No. 138. Funding not specified.

AGENCY: DOE **SUBJECT**: ENERGY
EIF DATE: 04/11/88 **TERM DATE**: 04/11/98
REMARKS: Establishing wider cooperation in areas of R&D. DOE Record #238. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/01/83 **TERM DATE**: 01/01/92
REMARKS: Fieldwork on impact structures in S. Australia, N. Territory, NSW and W. Australia. Funding by NASA: $40,700.

Appendix I: AUSTRALIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 0/5/0/1/83 **TERM DATE:** / /

REMARKS: Continuing agreement. Cooperating mineral resources assessments, paleoseismological investigations of surface rupturing faults, ground water studies, international strategic minerals inventory. USGS funding: $51,500; GOA: $7000.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 10/01/69 **TERM DATE:** 10/16/90

REMARKS: Projects and technical exchanges carried out under the U.S.-Australia S&T Agreement. All modes of transport and policy (regulatory) issues. Each side pays costs of its participation.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 08/01/76 **TERM DATE:** / /

REMARKS: Termination date: Indefinite. NIH National Library of Medicine MEDLARS Agreement with the National Library of Australia. Quid pro quo interlibrary exchange. Funding not specified.

AGENCY: NASA **SUBJECT:** Space Flight Operations
EIF DATE: 05/29/89 **TERM DATE:** 05/02/00

REMARKS: Continuation of a cooperative program facilitating space flight operations. Funding not specified.

AGENCY: NASA **SUBJECT:** Atmospheric Science
EIF DATE: 07/24/85 **TERM DATE:** 07/24/90

REMARKS: Funding is NASA programmatic. Long-duration balloon flight program. Flights originate in Australia. A new combined, long duration/short duration agreement is under discussion.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/01/64 **TERM DATE:** 02/26/00

REMARKS: NASA tracking stations in Australia. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 09/01/87 **TERM DATE:** 09/01/97

REMARKS: Sounding rocket agreement. Funding is NASA programmatic.

AGENCY: NASA **SUBJECT:** Space and Aeronautics
EIF DATE: 07/21/81 **TERM DATE:** 02/26/90
REMARKS: Funding not specified.

AGENCY:NASA **SUBJECT:** Atmospheric Science
EIF DATE: 01/13/85 **TERM DATE:** 07/24/90
REMARKS: Funding is NASA programmatic.

AGENCY: NSF **SUBJECT:** Basic Science
EIF DATE: 10/01/68 **TERM DATE:** 11/01/90
REMARKS: Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 02/22/82 **TERM DATE:** / /
REMARKS: Agricultural R&D; soil and water conservation, industrial utilization. Funding not specified.

AUSTRIA

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 04/14/87 **TERM DATE:** 04/14/92
REMARKS: Agreement between NIH and the Austrian Science Foundation for support of biomedical scientists exchanges. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 11/27/89 **TERM DATE:** 11/27/94
REMARKS: Source Term Research and Application with OEFZS. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 02/28/89 **TERM DATE:** 02/27/94
REMARKS: Joint research; joint S&T education projects; visits; exchange of personnel & information; meeting, seminar, & workshop support. Previous agreement: 1984-1989. Funding not specified.

BANGLADESH

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 05/01/82 **TERM DATE:** 01/01/95
REMARKS: Modernization of Geological Survey and training of staff. Funded by Asian Development Bank at $522,000 in FY 1990.

BELGIUM

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 01/19/81 **TERM DATE:** 01/19/94
REMARKS: Establish an exchange of technology in the field of radioactive waste management to include terminal storage in geological formations; technology of retrievable storage; waste processing technology and environmental effects. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/06/78 **TERM DATE:** 05/02/93
REMARKS: Information exchange and general technical cooperation with the Belgian Government. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/83 **TERM DATE:** / /
REMARKS: Severe accident research with BNL and CEN/SCK. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/02/85 **TERM DATE:** 06/01/90
REMARKS: Activities include scientific exchanges and fellowships, joint seminars and workshops, joint research, and staff exchanges. Funding not specified.

BELIZE

AGENCY: DOD **SUBJECT:** Health
EIF DATE: **TERM DATE:**
REMARKS: Uniformed Services of Health Sciences Agreement with the Ministry of Health, Belize City Hospital; epidemiological investigations and medical research in tropical diseases.

BOLIVIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 08/17/84 **TERM DATE:** 08/12/94
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 12/08/89 **TERM DATE:** 12/08/91
REMARKS: Geologic & mineral resources assessment project. Funded by Trade and Development Program: $270,000.

BOTSWANA

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 08/13/86 **TERM DATE:** 08/12/94
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

BRAZIL

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE:05/05/86 **TERM DATE:** 05/05/94
REMARKS: Establish facilities to be incorporated into the Global Seismograph Network. Funding not specified.
AGENCY: DOC (NOAA) **SUBJECT**: Space Technologies
EIF DATE: 05/05/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOD **SUBJECT**: Meteorology
EIF DATE: / / **TERM DATE:** / /
REMARKS: MOU agreement between the U.S. Air Force and Brazil on weather and ionospheric experiments. DOD record number 147. Funding not specified.

AGENCY: DOD **SUBJECT**: Meteorology
EIF DATE: 08/08/88 **TERM DATE:** 08/08/93
REMARKS: Agreement-DEA. Involves Brazil and the U.S. Air Force. Concerns weather data and forecasting and analysis. Defense Record No. 145. Funding not specified.

AGENCY: DOD (DMA) **SUBJECT**: Space
EIF DATE: 08/02/90 **TERM DATE:** / /
REMARKS: Agreement between the Defense Mapping Agency and the Brazilian Geographic and Statistical Institute (IBGE) for operation of a satellite tracking station to collect geodetic and geophysical data.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 03/29/84 **TERM DATE:** / /
REMARKS: On-going agreement; areas for cooperation: Civil aviation; urban mass transit; vehicle fuel conservation & alternative fuel technology; and highway transportation. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/77 **TERM DATE:** / /
REMARKS: Termination date is indefinite. NIH/National Library of Medicine MEDLARS Agreement with Centro Latino-Americano de Informaciao em Cienceas de Salude (BIREME); quid pro quo interlibrary exchanges. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 06/08/90 **TERM DATE:** 06/08/95
REMARKS: Cooperative atmospheric research program using small sounding rockets. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/20/76 **TERM DATE:** 05/18/94
REMARKS: Information exchange and general technical cooperation with CNEN. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 04/13/84 **TERM DATE:** 05/01/91
REMARKS: Projects under S&T umbrella agreements; information and personnel exchanges; joint research, seminars, workshops and meetings. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 03/06/84 **TERM DATE:** 05/01/91
REMARKS: S&T initiative signed by Presidents Sarney and Reagan; NSF has a lead role in basic sciences and engineering, and approximately $600,000 has been designated for NSF: $300,000 for basic sciences; the rest for engineering.

AGENCY: U.S. Gov. **SUBJECT:** S&T Umbrella
EIF DATE: 12/01/71 **TERM DATE:** 04/01/90
REMARKS: The agreement was funded by the Presidential S&T initiative ($2 million from U.S. and $2 million from Brazil); State Dept. is executive agent. Additional funding not specified. Projects in engineering, agriculture, basic science, energy, environment.

BULGARIA

AGENCY: DOI (USGS) **SUBJECT:** Basic Sciences
EIF DATE: 02/09/78 **TERM DATE:** 02/09/93
REMARKS: Joint research, seminars and workshops, and short-term project development visits. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/18/90 **TERM DATE:** 05/18/93
REMARKS: Original agreeement (11/04/86) was renewed in 1990 for 3 years. Agreement between HHS and the Bulgarian Medical Academy for support of biomedical scientist exchanges under the umbrella U.S.-Bulgaria agreement. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 02/09/78 **TERM DATE:** 02/09/93
REMARKS: Joint research, seminars and workshops; and short-term project development visits. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: A previous Joint Statement between the USDA and Bulgaria expired at the end of 1984. The only substantive changes in the proposed Joint Statement are Article IV on the protection of IPR and an annex covering this issue in detail. Funding not specified.

BURMA

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 09/30/87 **TERM DATE:** / /
REMARKS: Technical assistance in conservation, resource management, and protected areas management; funding of $23,000. This project originally funded at $60,000; because of problems in Burma, funds were returned to USAID/India. Funding now unsure. May expand to Pakistan and India.

CAMEROON

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 11/09/88 **TERM DATE:** 11/09/93
REMARKS: Measurement of gas recharge rate and thermal fluids of Lakes Nyos and Monoun. USGS: $5,200; Nat. Geographic, USAID, and Cameroon Government: $14,100.

CANADA

AGENCY: DOC (NIST) **SUBJECT:** Basic Sciences
EIF DATE: 09/20/88 **TERM DATE:** 09/20/93
REMARKS: Action is in support of NIST statutory mission to collect, evaluate, and publish standard reference scientific data. Agreement states NIST owns database and specifies royalties for use to be paid to NIST. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Atmospheric Science
EIF DATE: 06/28/85 **TERM DATE:** 06/27/90
REMARKS: MOU to improve climate cooperation and coordination. Current projects include development of programs to address climate change and impact on the Great Lakes region of North America and on the High Plains region of North America. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 07/26/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOC (CENSUS) **SUBJECT:** Statistics
EIF DATE: 03/27/86 **TERM DATE:** 03/27/91
REMARKS: MOU recognizes long-standing informal cooperation and provides for its condtinuation, exchange visits, joint study and research and, in an important annex, a joint project to reconcile trade statistics like the customs of both nations. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Canada and U.S. Navy. Concerns software engineering technology. Defense Record No. 452. Funding not specified.

Appendix I: CANADA

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 06/04/79 **TERM DATE:** 12/04/94
REMARKS: Establish a framework for cooperation with R&D activities in tar sands and heavy oil extraction processing and related technologies. DOE record # 46. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fusion)
EIF DATE: 11/19/87 **TERM DATE:** 11/19/92
REMARKS: Finding solutions to mutually agreed-upon problems associated with the development of magnetic fusion as a source of energy. DOE record No. 227. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 08/25/82 **TERM DATE:** 08/29/92
REMARKS: Study of topics associated with management of radioactive waste and related activities of nuclear cycle, i.e., preparation and packaging, decontamination and decommissioning; surface and subsurface storage, etc. DOE record No. 107. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 12/04/86 **TERM DATE:** 12/04/96
REMARKS: Establishing wider cooperation in the areas of research and development. DOE record No. 194. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/31/86 **TERM DATE:** 04/01/91
REMARKS: Atmospheric deposition: Standardization of monitoring equipment and procedures; Canada provides estimated $20,000 in funding.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 04/02/81 **TERM DATE:** 04/01/91
REMARKS: Joint geological, hydrological, and mapping projects; international strategic minerals inventory. USGS funding: $120,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/09 **TERM DATE:** / /
REMARKS: Entry into Force: 1909, and continuing. Joint water data acquisition activities stemming from Boundary Waters Treaty of 1909. Funded by IJC at about $500,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 09/01/89 **TERM DATE:** / /
REMARKS: Entry into Force: 1989, and continuing. Joint studies of hydrologic impacts of climate change in Red River Basin, Canada. Canada funds their own participation. USGS funding: $90,000.

AGENCY: DOI (BLM) **SUBJECT:** Natural Resources
EIF DATE: 01/01/61 **TERM DATE:** / /
REMARKS: North American Forestry Commission; Exchange information and advise the FAO Committee on Forestry concerning forest and wildfire management practices. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT:** Nature Conservation
EIF DATE: 07/17/87 **TERM DATE:** / /
REMARKS: To conserve, through joint cooperation and coordination of users and management authorities the migrating Porcupine Caribou Herd. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 03/16/88 **TERM DATE:** / /
REMARKS: Tripartite cooperation on waterfowl and wetlands conservation. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 06/18/70 **TERM DATE:** / /
REMARKS: Extremely active ongoing agreement concerning all areas of transportation; civil aviation, marine technology, urban transport, highway/traffic safety, highway research, systems for disabled, hazardous materials transport. Funding not specified.

AGENCY: DOT **SUBJECT:** Environment
EIF DATE: 11/22/78 **TERM DATE:** / /
REMARKS: US-Canadian Great Lakes Water Quality Agreement, providing for restoration and maintenance of chemical, physical, biological integrity of Great Lakes Basin ecosystem. Implements pollution control objectives of US-Canada Boundary Waters Treaty of 1909. Funding not specified

Appendix I: CANADA

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 02/04/87 **TERM DATE:** / /
REMARKS: Declarations of intent on toxic pollution of Niagara River and Lake Ontario. EPA, Environment Canada, NY State Dept of Environmental Conservation and Ontario Ministry of Environment entered into agreement; also on Boundary Waters Treaty of 1909. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 10/17/85 **TERM DATE:** / /
REMARKS: EPA-Environment Canada MOU of accidental and unauthorized discharges of pollutants along inland boundary. Contains plans to deal with accidental releases of pollutants, joint contingency plan for inland border areas of Great Lakes and maritime areas. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 10/28/86 **TERM DATE:** 10/28/91
REMARKS: MOU on the transboundary movement of hazardous wastes for treatment, storage and disposal. It has proven very effective in providing notification, tracking and control of hazardous waste shipments between the U.S. and Canada. Funding not specified.

AGENCY: HHS **SUBJECT:** Health Statistics
EIF DATE: 01/01/87 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Cooperation between the CDC National Center for Health Statistics and Vital Statistics Council for Canada; Statistics Canada Advisory Commission on health statistics. Funding not specified.

AGENCY: NASA **SUBJECT:** Space & Aeronautics
EIF DATE: 07/09/76 **TERM DATE:** / /
REMARKS: Cooperative participation in the development and procurement of a Space Shuttle Attached Remote Manipulator System. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/10/84 **TERM DATE:** 10/15/91
REMARKS: Severe accident research with AECL. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/21/89 **TERM DATE:** 06/21/94
REMARKS: Information exchange and general technical cooperation with AECB. Funding not specified.

CHILE

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 04/01/87 **TERM DATE:** 09/30/90
REMARKS: Seismic zoning and implementation of improved earthquake resistant designs; funded by AID/OFDA at $33,600.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 09/16/87 **TERM DATE:** 08/02/92
REMARKS: Mineral resource study of Taitao Peninsula. USGS funding: $8,600; Colorado School of Mines $2,100.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 08/02/85 **TERM DATE:** 08/02/93
REMARKS: Use of Easter Island airport as a Space Shuttle emergency landing. Funding not specified.

CHINA

AGENCY: DOC (NIST) **SUBJECT:** Metrology
EIF DATE: 01/01/79 **TERM DATE:** 05/01/89
REMARKS: Active while in process of renewal. Sample joint studies are in metrology, standards (including engineering standards), and related applied sciences; temperature, electrical, optical, length, mass, and time measurements and standards. Funding N/A

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 11/09/85 **TERM DATE:** 07/01/90
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 07/08/85 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

Appendix I: CHINA

AGENCY: DOC (NOAA) **SUBJECT:** Marine Science
EIF DATE: 05/08/79 **TERM DATE:** 05/09/94
REMARKS: Protocol on Cooperation in Field of Marine and Fisheries S&T is framework for: Information exchange, collaborative research(TOGA), and training (scientific training and data management). Other participants: NSF, ONR, academia. China: CAS, Ministry of Agriculture, MAAF. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Atmospheric Science
EIF DATE: 05/08/79 **TERM DATE:** 05/08/94
REMARKS: Protocol on Cooperation in Atmospheric S&T; joint meteorologic studies; training, other participating agencies- NSF, NASA, USDA. Chinese- CAS, National Natural Science Foundation, Ministry of Education; State Meteorological Administration. Funding not specified

AGENCY: DOC (CENSUS) **SUBJECT:** Statistics
EIF DATE: 07/24/84 **TERM DATE:** / /
REMARKS: Low level activity consisting primarily of Chinese delegations to the U.S.; the U.S. taught one workshop in China in 1990, may provide 6-8 weeks workstudy to 3 Chinese before end of CY90. Discussions have begun on renewal. Funding not specified.

AGENCY: DOD (COE) **SUBJECT:** Water Resources
EIF DATE: 04/09/86 **TERM DATE:** 04/04/91
REMARKS: Protocol under the umbrella S&T agreement on water resources and related subjects; agreement between the Department of Army and Ministry of Water Resources and Electric Power; annexes for specific studies involving the Corps of Engineers currently. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 04/16/85 **TERM DATE:** 04/16/90
REMARKS: Cooperation in fossil energy R&D with emphasis on atmospheric and pressurized fluid bed combustion; surface coal gasification; coal liquefaction and enhanced oil recovery, other participating agencies- NASA, NOAA, NCAR. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 11/19/86 **TERM DATE:** 11/19/91
REMARKS: Protocol designed to promote cooperation and exchanges in the field of wildlife conservation and protected natural areas. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 04/15/85 **TERM DATE**: 04/30/91
REMARKS: Survey and Mapping Protocol; joint projects in mapping applications of remote sensing; development of geographic information systems and geographic names databases in cooperation with DMA and NOAA. USGS Funding: $3,200.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 01/23/95
REMARKS: Earthquake Studies Protocol; studies on crustal structures in fault zones; premonitory phenomena; crustal stress measurements; seismic networks; rock mechanics; intraplate active fault studies. Funding: $35,000 from USGS; $75,000 from PRC.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 10/17/81 **TERM DATE**: 10/17/91
REMARKS: Surface Water Hydrology Protocol; joint research in sediment transport, hydrologic extremes, hydrologic measurements; ice and snow hydrology. USGS funding: $65,000; PRC: $65,000.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 04/30/91
REMARKS: Earth Science Protocol; joint research on pyrophylite; geochemical anomalies in Xinjiang and Southwestern U.S.; genetic model of Bayan Obo iron niobium rare earth deposit; S. China and W. U.S. granitoid rocks. USGS funding: $13,100; PRC: $20,000.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 04/30/91
REMARKS: Protocol under S&T umbrella agreement; joint program with NSF. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT**: Natural Resources
EIF DATE: 11/19/86 **TERM DATE**: 11/19/91
REMARKS: Exchange of scientists to work on activities relating to conservation of wildlife and their habitats. Funding not specified.

AGENCY: DOT **SUBJECT**: Transportation
EIF DATE: 01/20/87 **TERM DATE**: / /
REMARKS: Ongoing agreement covers all areas of search and rescue cooperation administered by USCG. There were no activities under this agreement in FY90. IPR provision in Governing Agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 05/11/83 **TERM DATE:** 04/13/91
REMARKS: Protocol with Ministry of Communications (MOC) under the umbrella S&T agreement; urban systems; transport research planning; highway construction and safety; civil aviation technical assistance. Army Corps of Engineers participates. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 10/10/86 **TERM DATE:** 05/11/88
REMARKS: Under renewal considerations. Covers all areas of highway transportation, research and development. IPR contained in Governing Agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 12/15/86 **TERM DATE:** 12/15/91
REMARKS: Covers all areas of rail transportation, research, and operations. Administered by the Federal Railroad Administration. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 05/06/87 **TERM DATE:** 05/11/88
REMARKS: Renewal under consideration. Port engineering and waterborne transport. Army Corp of Engineers also participates. Funding will be decided on a case-by-case basis. IPR contained in Governing Agreement.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 02/05/80 **TERM DATE:** 04/30/91
REMARKS: US-PRC Protocol on Environmental Cooperation, extended to co-terminate with S&T agreement, involves five on-going projects--health effects, air pollution, soil and ground pollution, climate change and CFC chemical and technology substitutes. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/22/79 **TERM DATE:** 06/22/93
REMARKS: Cooperation under Health Protocol with Chinese Academy of Medical Sciences; cancer; cardiovascular diseases; infectious diseases; environmental health; human genetics; reproductive physiology; immunology; biomedical information science; food and drugs. Funding not specified.

Appendix I: CHINA

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 08/01/87 **TERM DATE:** 08/01/92
REMARKS: MOU Agreement between the National Eye Institute, NIH, and the Zhongshan Ophthalmic Center, Chinese Academic Medical Sciences: Joint vision research projects, exchange scientist programs, cooperation in clinical trials. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/28/83 **TERM DATE:** 06/28/92
REMARKS: Original agreement renewed in 1989. Agreement between National Institute of Neurological and Communicative Disorders and Stroke, NIH, and the Shanghai Brain Research Institute, Academy of Sciences. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/89 **TERM DATE:** 01/01/93
REMARKS: MOU Agreement between CDC and the Chinese Academy of Preventive Medicine to establish a "sister institution" relationship. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/17/81 **TERM DATE:** 10/17/91
REMARKS: Information exchange, and general technical cooperation with NNSA; protocol. Funding not specified.

AGENCY: NSF **SUBJECT:** Earth Sciences
EIF DATE: 01/24/80 **TERM DATE:** 04/30/91
REMARKS: Protocol under S&T umbrella agreement; joint program with USGS. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 12/10/80 **TERM DATE:** 12/09/90
REMARKS: Protocol under extended S&T umbrella agreement; basic and applied sciences, energy, and social sciences. Funding not specified. May be continued with S&T umbrella agreement.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 01/31/79 **TERM DATE:** 04/30/90
REMARKS: Original umbrella agreement left IPR considerations to the individual MOU under the umbrella. Currently operating under extension. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 01/31/79 **TERM DATE:** / /
REMARKS: Agricultural R&D under the umbrella S&T agreement; provides for exchange of germplasm like alfalfa, soybeans, pecans; disease resistance breeding in cotton, tomato, cabbage. Other participating agencies-Chinese Ministries of Forestry, Commerce, Water Conservancy. Funding not specified.

COLOMBIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 06/22/84 **TERM DATE:** 06/22/89
REMARKS: Provides for exchanges of scientific and technical information and exchange visits by scientists. New agreement being negotiated. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 03/12/81 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the Pan American Federation of Associations of Medical Schools; quid pro quo interlibrary exchanges. Funding not specified.

COTE_D'IVOIRE

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/21/86 **TERM DATE:** / /
REMARKS: Establishes a station for the reference network. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/01/86 **TERM DATE:** 01/31/94
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/87 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Centers for Disease Control & Ministry of Health collaboration in HIV-1 and HIV-2 epidemiology, laboratory surveillance and research. Funding not specified.

CZECHOSLOVAKIA

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF Date: 04/14/89 **TERM DATE:** 04/14/94
REMARKS: Information exchange and general technical cooperation. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/27/88 **TERM DATE:** 06/27/91
REMARKS: Basic framework of cooperation, activities to include cooperative research projects, joint seminars and workshops, and individual scientific visits. Funding not specified.

DENMARK

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 01/01/80 **TERM DATE:** 07/01/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/03/75 **TERM DATE:** 09/29/85
REMARKS: Information exchange, and general technical cooperation. Renewal being negotiated. Funding not specified.

EGYPT

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 08/10/87 **TERM DATE:** 10/01/92
REMARKS: Training and research, technical assistance in natural areas management. This is one of three Special Foreign Currency programs run by the FWS (India, Pakistan) in which excess foreign currency is held by the FWS for use in conservation programs. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE:** 11/01/91
REMARKS: AID-funded NIH program under the Congressionally mandated Middle East Regional Cooperative Program established following the Camp David Accord; epidemiologic and immunologic studies on vector-borne diseases.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/84 **TERM DATE:** 05/01/91
REMARKS: U.S.-Egypt agreement on health cooperation to develop projects on environmental health, respiratory infections, eye diseases, congenital anomalies, lymphoma/leukemia research, biomedical instrumentation, drugs, biologies, health statistics. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/08/81 **TERM DATE:** 06/08/86
REMARKS: Information exchange and general technical cooperation with NEA; extension being renegotiated. Funding not specified.

AGENCY: US GOV **SUBJECT:** S&T Umbrella
EIF DATE: 11/09/86 **TERM DATE:** 11/09/91
REMARKS: Agreement relating to cooperation in the areas of science and technology. Funding not specified.

EUROPEAN COMMUNITY

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 12/06/83 **TERM DATE:** 12/06/88
REMARKS: Joint Communique of 04/28/88 to pursue renewal for program of agricultural and natural resource cooperation in the fields of tropical agriculture, agriculture in arid zones, animal husbandry, soil conservation, crop forecasting, pest control. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 10/06/82 **TERM DATE:** 10/06/92
REMARKS: Exchange of information on the management of radioactive waste, i.e., characterization of waste forms and disposal in geologic formations. DOE record No. 110. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 07/07/86 **TERM DATE:** 07/07/91
REMARKS: Cooperation on a range of R&D aspects of radiation protection in areas such as: Source and dose determination; environmental processes and effects; somatic health effects; genetic health effects, etc. DOE record No. 185. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fusion)
EIF DATE: 12/15/86 **TERM DATE:** 12/15/96
REMARKS: Maintain and intensify cooperation between EURATOM and DOE in areas covered by their respective magnetic fusion programs to develop scientific understanding and technology underlying a magnetic fusion power system. DOE record No. 195. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 01/28/82 **TERM DATE:** 06/30/90
REMARKS: Nuclear material safeguards research and development. DOE record No. 97. Funding not specified.

AGENCY: US Gov **SUBJECT:** Energy
EIF DATE: 11/08/58 **TERM DATE:**12/31/95
REMARKS: The Agreement for Cooperation between the Government of the United States of America and the European Atomic Energy Community concerning Peaceful Uses of Atomic Energy.

AGENCY: US Gov **SUBJECT:** Environment
EIF DATE: 06/04/74 **TERM DATE:** / /
REMARKS: Letters establishing the framework for cooperative environmental activity. Initial areas of interest include exchange of information on methods of analysis and measurement of certain air and water pollutants. Funding not specified.

AGENCY: USDA **SUBJECT:** Remote Sensing
EIF DATE: / / **TERM DATE:** / /
REMARKS: Remote sensing applications to agriculture and forestry. Unsigned, under negotiations. Funding not specified.

FINLAND

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/25/89 **TERM DATE:** 10/25/94
REMARKS: Scientific & technical cooperation; no activity in FY 1990. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 07/23/81 **TERM DATE** / /
REMARKS: Icebreaking technology and other subjects as may be agreed. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/29/82 **TERM DATE:** / /
REMARKS: Termination date indefinite. MOU between PHS/CDC and the Ministry of Social Affairs and Health of Finland on occupational safety and health, food and drugs, alcohol abuse and health services, vaccine development, biomedical research and exchange of information. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 04/26/89 **TERM DATE:** 04/26/93
REMARKS: Participation in Severe Accident Research Program with STUK and VTT. Effective upon signature of parties. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/26/80 **TERM DATE:** 07/09/95
REMARKS: Information exchange and general technical cooperation with STUK. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 04/07/86 **TERM DATE:** 04/07/91
REMARKS: Projects under the umbrella S&T agreement; prior MOU existed from 8/80-8/85; visits; personnel and staff exchanges; fellowships; joint research, seminars, and workshops. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 09/15/85 **TERM DATE:** 09/15/90
REMARKS: Agreement on cooperation in Science and Technology; agreement contains an Intellectual Property Annex for protection of copyrights, patents, other intellectual property; individual cooperating agencies negotiate funding with counterpart agencies.

FRANCE

AGENCY: DOC **SUBJECT:** Tech Commercialization
EIF DATE: 02/25/86 **TERM DATE:** 02/25/91
REMARKS: Through Technology Administration. Modeled after Israel BIRD and India PACT agreements. Progressing satisfactorily; 27 joint ventures to date. Funding not specified.

Appendix I: FRANCE

AGENCY: DOC (NIST) **SUBJECT:** Engineering
EIF DATE: 12/31/86 **TERM DATE:** 12/31/91
REMARKS: This is the fourth five-year joint program of research in building technology under an understanding signed in 1969 by the Science Advisor to the President. Cooperation in building technology; joint research and exchanges. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 03/20/86 **TERM DATE:** / /
REMARKS: France provides onboard data collection system flown on NOAA polar-orbiting satellite; France also provides the data processing system for ARGOS. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Marine Science
EIF DATE: 11/01/69 **TERM DATE:** / /
REMARKS: U.S.-France Cooperation in Oceanography: joint multidisciplinary oceanographic research; information and data exchanges. Funding not specified.

AGENCY: DOD **SUBJECT:** Avionics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Unclassified agreement between the U.S. and France as published on June 1990 Combined Annual Report to Congress by DOD on standardization of equipment with NATO members and cooperative R&D projects with Allied countries. Advanced Avionics. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: ADA Programming Support Environment. Unclassified agreement between the U.S. and France listed in June 1990 Combined DOD Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with allied countries. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: C3 Interoperability (NPIS)-Unclassified project between the U.S. and France listed in June 1990 DOD Combined Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with Allied countries. Funding not specified.

Appendix I: FRANCE

AGENCY: DOD **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: POST 2000 TACTICAL AREA COMMUNICATIONS-Unclassified Project between the U.S. and France listed in DOD's June 1990 Combined Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D Projects with Allied countries. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: MIDS-Multi-Functional Information Distribution Systems. Unclassifed project between the U.S. and France listed in DOD's June 1990 Combined Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with Allies. Funding not specified.

AGENCY: DOD **SUBJECT:** Medical Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement - DEA, involving France and the U.S. Air Force. Concerns high enthalpy flow diagnostic and measurements. Defense Record No. 222. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns computational fluid dynamic techniques. Defense Record No. 236. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns materials/measurements/characterization. Defense Record No. 244. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns carbon and ceramics material. Defense Record No. 245. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France, the U.S. Air Force and Navy. Concerns digital systems architecture and integration. Defense Record No. 524. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Army. Concerns integrated circuit components technology. Defense Record No. 848. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Army. Concerns dynamic behavior of materials. Defense Record No. 894. Funding not specified.

AGENCY: DOD **SUBJECT:** Acoustics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns acoustics research. Defense Record No. 483. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns ceramic and metal matrix composites. Defense Record No. 507. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns artificial intelligence. Defense Record No. 508. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 05/31/85 **TERM DATE:** 05/31/90
REMARKS: Cooperate on research, development, testing, and evaluation of technology and procedures to improve national nuclear material accounting and control measures. DOE record No. 160. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 04/22/83 **TERM DATE:** 04/22/93
REMARKS: Cooperation on research, development, testing and evaluation to improve physical protection of nuclear materials and facilities. DOE record No. 122. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 12/19/88 **TERM DATE:** 12/19/90
REMARKS: Establish and cover a program of scientific cooperation to engage in and be specifically limited to the unclassified utilization of high power lasers in laser-matter interaction physics, diagnostics, and associated technical developments. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 09/13/85 **TERM DATE:** 09/13/90
REMARKS: Establish a basis for cooperation in the field of remote systems technology, i.e., applications feasability; remote work efficiency; optimization and refinement. DOE record No. 165. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 01/18/77 **TERM DATE:** 12/31/90
REMARKS: Establish for mutual benefit a balanced exchange of LMFBR tech, i.e., safety to include experimental out-of-pile and in-pile research and theoretical analyses; and physics including nuclear data, calculation methods, etc. DOE record No. 26. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 02/16/88 **TERM DATE:** 02/16/91
REMARKS: Establish a balanced exchange of energy information on enhanced oil recovery techniques. DOE record No. 233. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 07/26/83 **TERM DATE:** 07/26/93
REMARKS: Cooperation in all phases of radioactive waste management. DOE record No. 127. Funding not specified.

Appendix I: FRANCE

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 06/20/86 **TERM DATE:** 06/20/91
REMARKS: Exchange and sharing of critical nuclear data. DOE record No. 184. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 07/23/88 **TERM DATE:** 07/23/91
REMARKS: Joint studies in water resources research, radioactive waste, oceanographic research, geochemistry research, mineral deposits, geophysics, and sea-ice research & remote sensing in polar regions. USGS: $26,500; France: $4,000.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 10/07/71 **TERM DATE:** / /
REMARKS: Ongoing. Program implemented with U.S., France, Germany, Italy, Japan, and the U.K. under the auspices of NATO CCMS. Funding: each side pools funds subject to availability.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 02/14/72 **TERM DATE:** / /
REMARKS: Exchanges on automated guideway transit assessment;project agreements include: automated guideway transit, marine traffic systems & pollution, tunneling technology, urban rail & traffic systems, waste and byproduct. Agreement ongoing. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 06/02/69 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 03/03/69 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/26/84 **TERM DATE:** 10/26/89
REMARKS: Agreement being renewed. NIH and the French Institute of Health & Medical Research-cancer, cardiovascular, pulmonary, immunology and infectious diseases, instrumentation, biomedical engineering and neuro-sciences, instrumentation; technical assessment, & AIDS. Funding not specified.

Appendix I: FRANCE

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 12/20/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the French Institute of Health & Medical Research; quid pro quo interlibrary exchanges. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 03/23/87 **TERM DATE:** / /
REMARKS: MOU between NASA and the French Centre National d'Etudes Spatiales for Joint Development of TOPEX/POSEIDON ocean project. Termination will occur one year after data collection from spacecraft ceases, or extended by agreement. Funding: NASA Programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 09/01/84 **TERM DATE:** 09/01/94
REMARKS: Use of Polynesian Island (Hao) as a Space Shuttle emergency landing site. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Energy
EIF DATE: 06/28/74 **TERM DATE:** 09/17/89
REMARKS: Information exchange and general technical cooperation with MIAT. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/05/87 **TERM DATE:** / /
REMARKS: International piping integrity research with CEA. To last for the duration of IPRG Program. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 12/31/86 **TERM DATE:** 12/31/91
REMARKS: Light water reactor safety research umbrella agreement with CEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 08/20/85 **TERM DATE:** 08/20/92
REMARKS: Study of Seismically Induced Strong Ground Motion at Shallow Soil Sites. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/15/84 **TERM DATE:** / /
REMARKS: Termination date open-ended. Provides for classified safety information exchange with the MIAT. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/16/86 **TERM DATE:** 09/16/91
REMARKS: Thermal hydraulic research with CEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 07/25/88 **TERM DATE:** 07/24/94
REMARKS: Assessment of Long Term Cable Aging Degradation with CEA. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 01/01/70 **TERM DATE:** 05/02/88
REMARKS: MOU for joint research and workshops. Continuing even though officially held up by IPR language. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 03/15/82 **TERM DATE:** 03/04/92
REMARKS: Agricultural S&T; forestry, comparison of remote sensing data for agricultural use, plant science, bioprocessing, economics, etc. Funding not specified.

THE GAMBIA

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 03/01/88 **TERM DATE:** 03/01/98
REMARKS: Use of Gambian Air field as a Space Shuttle emergency landing site.

GERMANY

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 03/01/77 **TERM DATE:** 08/01/90
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

Appendix I: GERMANY

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns microelectronics and their applications. Defense Record No. 943. Funding not specified.

AGENCY: DOD **SUBJECT:** Environment
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns environmental technology. Defense Record No. 945. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns software technology. Defense Record No. 954. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-MOU. Involves Germany and the U.S. Air Force. Concerns powder metallurgy of titanium alloys. Defense Record No. 329. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 12/20/74 **TERM DATE:** 12/31/89
REMARKS: Cooperation in radioactive waste management regarding the disposal of separated waste products and disposal of spent fuel. DOE record No. 18. To be extended 5 years. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 02/11/77 **TERM DATE:** 02/11/92
REMARKS: Development of gas-cooled reactors: possible use as high temperature gas-cooled reactors for steam cycle, direct cycle or process heat, or as gas-cooled fast breeder reactors. DOE record No. 27. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 06/08/76 **TERM DATE:** 12/31/90
REMARKS: Finding solutions to problems connected with design, development, construction, and operation of nuclear power systems utilizing LMFBRs and to exchange information developed during the resolution of these problems. DOE record No. 23. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 04/24/87 **TERM DATE:** 04/24/92
REMARKS: Establish basis for cooperation in field of remote systems technology in areas such as remote connector evaluations, low-flow ventilation system (off-gas technology), robotic process samples and advanced semimanipulator hardware. DOE record No. 200. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 07/01/75 **TERM DATE:** 07/16/91
REMARKS: Joint research in marine seismology, radioactive wastes, petroleum resource assessment and Antarctic studies; sea-ice studies, marine minerals; international strategic minerals inventory. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 09/03/75 **TERM DATE:** / /
REMARKS: Ground Transportation, like track mag/lev high speed; advanced transport technologies and related aspects; energy and transport, civil aviation, vessel traffic systems, transport economics and planning. Ongoing agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 11/05/70 **TERM DATE:** / /
REMARKS: Program carried out by the U.S., France, Germany, Italy, Japan, and the United Kingdom. Begun under the auspices of NATO CCMS. Continuing agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 07/12/78 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

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AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 06/12/78 **TERM DATE:** / /
REMARKS: Ongoing agreement with Ministry of Research and Technology, (MORT) and Ministry of Transport regarding Development of Advanced Ground Transport- Project Agreement concerning Magnetic Levitation Transport System Safety established in 5/90. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 05/09/74 **TERM DATE:** / /
REMARKS: Self-renewing agreement with German Ministry of Environment, Nature Protection, and Nuclear Safety; cooperation on auto emissions, acid deposition, economic incentives, regulatory approaches, emission and effluent control technologies, chemical and pesticide regulations. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/08/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the FRG Institute of Medical Documentation and Information; quid pro quo interlibrary exchanges. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/76 **TERM DATE:** 09/01/91
REMARKS: Agreement with Ministry of Research and Technology in cardiovascular, pulmonary, and blood diseases, cancer arthritis and AIDS research. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 08/08/82 **TERM DATE:** / /
REMARKS: MOU between NASA and Germany's Federal Minister for Research and Technology on the Roentgensatellit Project (ROSAT). Agreement will continue until terminated with one year's notice. The FRG provided the spacecraft and telescope. Funding is NASA programmatic.

Appendix I: GERMANY

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 10/15/81 **TERM DATE:** / /
REMARKS: MOU between NASA and Federal Minister for Research and Technology on cooperative participation in the Active Magnetospheric Particle Tracer Explorers (solar physics-winds ions). Expiration with one year's notice. Funding is NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 10/05/77 **TERM DATE:** / /
REMARKS: MOU between NASA and the Federal Minister for Research and Technology of Germany. Agreement continues until terminated with one year's notice. Cooperative participation in Galileo mission to Jupiter. Spacecraft launched 10/89. Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** Shuttle Utilization
EIF DATE: 07/10/89 **TERM DATE:** 12/31/99
REMARKS: MOU between NASA and the Federal Ministry of Research and Technology of Germany concerning Space Shuttle flight activities, covering the D-2 mission (1992) and possible future activities to study the effects of microgravity. Funding is NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 10/06/87 **TERM DATE:** / /
REMARKS: MOU between NASA and the Federal Minister for Research and Technology of Germany for cooperative flights of the Spaceborne Imaging Radar (SIR) with the X-Band Synthetic Aperture Radar (X-SAR). Expires one year after final mission. Funding: NASA Programmatic.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 04/30/81 **TERM DATE:** 04/30/91
REMARKS: Reactor safety research program; umbrella agreement with BMFT. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/85 **TERM DATE:** 06/30/87
REMARKS: Gundremmingen KRB-A reactor pressure vessel. Expired: New agreement under negotiation. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/13/90 **TERM DATE:** 12/31/90
REMARKS: Cooperation to further develop the LMR Version of the CONTAIN Code with KfK. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 07/06/81 **TERM DATE:** / /
REMARKS: Termination date: open-ended. Provides for classified safety information exchange with the BMU. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/01/75 **TERM DATE:** 07/17/91
REMARKS: Information exchange and general technical cooperation with BMU. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/06/85 **TERM DATE:** 02/06/90
REMARKS: Thermal hydraulic research, with BMFT; extension under discussion. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: / / **TERM DATE:** / /
REMARKS: Severe accident research with KFK. New agreement under negotiation. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 08/30/88 **TERM DATE:** 07/17/91
REMARKS: Accident Management Research under BMU Arrangement. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 06/01/81 **TERM DATE:** 06/01/91
REMARKS: Agricultural S&T; plant biotechnology, integrated pest management, reproductive biology of swine, etc. Funding not specified.

GREECE

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/18/78 **TERM DATE:** 10/17/88
REMARKS: Information exchange and general technical cooperation; renewal awaiting signature. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 06/29/81 **TERM DATE:** 06/29/91
REMARKS: Germplasm exchange (Agricultural S&T). Currently in abeyance - no activities planned. No funding information available.

GUATEMALA

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/79 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Ministry of Health, Universidad del Valle, and the U.S. Centers for Disease Control collaborate in vector-borne parasitic disease research and training. Funding not specified.

HUNGARY

AGENCY: DOC (NIST) **SUBJECT:** Metrology
EIF DATE: 11/22/84 **TERM DATE:** / /
REMARKS: Implementing arrangement under Articles II and III of the Agreement on Cooperation in Culture, Education, Science, and Technology signed April 6, 1977. Provides for short-term exchange of scientists, extended visits in cooperating laboratories. Funding not specified.

AGENCY: DOC (NIST) **SUBJECT:** Metrology
EIF DATE: 04/01/77 **TERM DATE:** / /
REMARKS: Implementing arrangement under Articles II and III of the Agreement on Cooperation in Culture, Education, Science, and Technology signed April 6, 1977. Provides for short-term exchange of scientists, extended visits in cooperating laboratories. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/09/88 **TERM DATE:** 12/31/92
REMARKS: Cooperative magnetostratigraphic studies; assist Hungarian earth science agencies in reorganization efforts. USGS: $5,000; Hungary: $2,.000.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 10/11/78 **TERM DATE:** / /
REMARKS: The Department of Transportation received a delegation of Hungarian Railroad officials on the 30th of October where information was exchanged on a wide spectrum of issues from economic policy to high-speed railway. Ongoing agreement. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 02/23/81 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Agreement between the National Cancer Institute and the Hungarian National Institute of Oncology for cancer research. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/04/89 **TERM DATE:** 10/04/94
REMARKS: US-Hungary S&T cooperation in medical sciences and health; joint research projects; joint scientific workshops; exchange of science and technology information. Renewable in 10 years. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 07/07/82 **TERM DATE:** 07/07/92
REMARKS: Joint research, seminars, and workshops; covers all aspects of basic and applied natural and engineering sciences, social sciences, and math. An earlier generation of this agreeement (NSF/KKI July '72) predated the umbrella. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 11/30/89 **TERM DATE:** 11/30/94
REMARKS: Funding: $300,000.

ICELAND

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 11/01/84 **TERM DATE:** 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 04/09/82 **TERM DATE:** 04/08/90
REMARKS: Agreement in cooperation with the National Research Council; information & personnel exchanges; joint research in geophysical, geological, & hydrological phenomena. In renewal process. Funding not specified.

INDIA

AGENCY: DOC (NIST) **SUBJECT:** Basic Sciences
EIF DATE: 10/28/74 **TERM DATE:** / /
REMARKS: Cooperation through US-Indo Joint Commission projects approve after 10/89 will be subject to IPR requirements. Includes projects in materials and physical sciences in cooperation with 20 Indian institutions. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 10/26/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Earth Sciences
EIF DATE: 10/01/74 **TERM DATE:** / /
REMARKS: Six joint research projects in the climate research program were approved under the Indo-U.S. Subcommission on S&T. Funding not specified.

AGENCY: DOD **SUBJECT:** Aeronautics
EIF DATE: 09/01/88 **TERM DATE:** / /
REMARKS: Term date in 2 yrs (extended 1 yr. at a time). U.S. Air Force consultancy and training related to US-India Aeronautical Cooperation Program. Services provided by letter of agreement defined by technical transfer guidelines approved by USG. Funding:$1,600,000. Active foreign military sales case.

AGENCY: DOD **SUBJECT:** Natural Resources
EIF DATE: 05/04/84 **TERM DATE:** 03/31/91
REMARKS: Investigate marine flora and fauna from Indian Ocean region as sources for eventual chemicals and drugs. Only marine science field research program between the U.S. and India. Technical supervisory committee meets annually. Funding: 28,606,120 Rupees.

AGENCY: DOD **SUBJECT:** Natural Resources
EIF DATE: 03/05/90 **TERM DATE:** 03/04/93
REMARKS: Determination of environmental, biological and biochemical parameters that control macrofouling of surfaces in the Indian waters. Emphasis on prevention and control of biodeterioration. Approved by Government of India. Funded by ONR: 1,982,000 Rupees.

AGENCY: DOD **SUBJECT:** Natural Resources
EIF DATE: 04/20/90 **TERM DATE:** 04/19/93
REMARKS: To extract and study the antifouling properties of selected bioactive compounds from marine organisms of the Indian Ocean. Project approved by Government of India/Department of Economic Affairs and funded by ONR: 1,986,000 Rupees.

AGENCY: DOD **SUBJECT:** Natural Resources
EIF DATE: 04/20/90 **TERM DATE:** 04/19/93
REMARKS: Neuroendocrine regulation of the larval development in marine-fouling crustacea. Project approved by the Government of India/Dept of Economic Affairs and funded by ONR - 1,971,000 Rupees.

AGENCY: DOD **SUBJECT:** Medical Research
EIF DATE: 02/09/90 **TERM DATE:** 02/08/91
REMARKS: Evaluation of new antimalarial drugs for prophylactic activity in primate models. This project, sponsored by Walter Reed Army Institute of Research, tests 10 drugs at Central Drug Research Institute in Lucknow. Contract and payment (1,626,000 Rupees) to CDRI.

AGENCY: DOD **SUBJECT:** Medical Research
EIF DATE: 10/26/82 **TERM DATE:** 10/31/91
REMARKS: Development of new anti-malarial drugs to combat drug-resistant P.Falciparum infections and to prevent relapse of P. Vivax malaria. Extensions held in abeyance on IPR matter; work continued with CDRI's own funds and 12,939,108 rupees from U.S. contract.

Appendix I: INDIA

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 09/22/86 **TERM DATE:** 09/30/91
REMARKS: Project studies properties of quasicrystals to design new alloy systems of unique properties and almost zero corrosion rate for iron-based metallic glasses. Funded at 3,308,300 RS. 2-yr extension with funds 1,400,000 Rupees, approved by DEA (6/90) and NIST cleared.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 09/22/86 **TERM DATE:** 09/30/91
REMARKS: A Study on 3 aspects of corrosion in order to better understand passivation of surfaces on a molecular basis. Funded at 2,413,500 Rupees, extended with 885,400 Rupees approved by DEA in June 1990; NIST also cleared extra funds.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 06/11/86 **TERM DATE:** 09/30/91
REMARKS: Study of wear-resistant tribological coatings in order to establish a link between sputter-deposition parameters for coating deposition and ultimate tribological performance. Funding at 2,570,000 Rupees (with 956,000 RS. more in 6/90 by DEA). NIST also cleared.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 04/14/89 **TERM DATE:** 04/13/92
REMARKS: To develop an extra low-carbon steel with high toughness, low impact transition temperature and with good formability and weldability. Funding at 1,500,000 Rupees.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 05/30/89 **TERM DATE:** 05/30/92
REMARKS: To develop a high resolution scanning tunneling microscope capable of operation in air and high vacuum. Project approved by U.S. and India. Funding: 11,100,000 Rupees; first payment released in May 1990.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 12/31/86 **TERM DATE:** 09/30/91
REMARKS: To study fracture and fatigue properties of advanced engineering ceramics for making them with desired microstructural and mechanical properties. Funding: 1,777,600 Rupees. 2-yrs. extension approved by DEA and cleared by NIST; 70,000 Rupees more allocated.

Appendix I: INDIA

AGENCY: DOD **SUBJECT**: Materials Research
EIF DATE: 09/22/86 **TERM DATE**: 09/30/91
REMARKS: Study variety of naval engineering materials to establish the process of corrosion and stress corrosion, so remedial measures can be suggested. Funding: 3,165,200 Rupees. 2-yrs. extension approved by DEA, with 917,000 Rupees more funded. NIST also approved.

AGENCY: DOD **SUBJECT**: Medical Research
EIF DATE: 09/01/84 **TERM DATE**: 08/31/91
REMARKS: Evaluation of interferon and interferon inducers in control of parasitic infections. Funding: 1,655,900 Rupees. Indo-US conference held in Lucknow in Sept., 1986. Emphasis of affect on malaria, leishmaniasis, filariasis, amebic meningoencephalitis.

AGENCY: DOD **SUBJECT**: Medical Research
EIF DATE: 09/14/84 **TERM DATE**: 08/31/91
REMARKS: To investigate the causes of and possible therapy for oral and cervical carcinomas---studying roles of herpes simplex virus types I and II. Funding: 951,400 Rupees.

AGENCY: DOE **SUBJECT**: Energy (Fossil)
EIF DATE: 08/31/87 **TERM DATE**: 08/31/92
REMARKS: Cooperation on R&D activities pertaining to enhanced oil recovery, underground coal gasification and related technologies. DOE record No. 214. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT**: Heritage Site Plan'g
EIF DATE: 05/18/89 **TERM DATE**: 05/18/94
REMARKS: Current projects include: Joint tourism studies, development and site conservation plans for Agra, Buddhist Heritage sites and World Heritage sites at Ajanta and Ellora. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/01/75 **TERM DATE**: / /
REMARKS: Continuing agreement. Research projects on Upper Mantle conductivity; seismic tomography for lithospeheric studies and land reclamation. No agreement, administered by the State Department. US-India fund provides about $20,000. USGS funding: $11,000.

Appendix I: INDIA

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 01/01/78 **TERM DATE:** / /
REMARKS: Research projects in endangered species; training in managment; public education efforts including development of the Indian Wildlife Institute. This is one of three Special Foreign Policy programs run by the FWS (Egypt, Pakistan). Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 11/01/86 **TERM DATE:** / /
REMARKS: Under US-India Fund for Educational, Cultural and Scientific Cooperation, EPA is collaborating with the GOI in studies addressing ozone depletion and the health effects of particulate air pollutants. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/09/86 **TERM DATE:** 09/09/91
REMARKS: MOU formalized long-standing relationship between NIH laboratories and selected Indian Council for Scientific and Industrial Research laboratories, basic research in cellular molecular biology and biophysics. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/01/87 **TERM DATE:** 06/01/92
REMARKS: Vaccine and immunodiagnostics development; vaccine quality control; immunization programs development; Vaccine Action Program is joint effort by PHS and USAID; Nodal Indian Agency is Department of Biotechnology with MOHFW and Council of Medical Research. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE:** 12/31/91
REMARKS: Projects under the Reagan-Gandhi S&T initiative; NIH conducts projects in immunology and reproduction, blindness prevention, leprosy, filariasis, tuberculosis, malaria. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 11/01/83 **TERM DATE:** 02/08/91
REMARKS: MOU for cooperation between ADAMHA and the Indian National Institute of Mental Health and Neuro Sciences (NIMHANS); projects in alcoholism, drug abuse, and mental health. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/62 **TERM DATE:** / /
REMARKS: Indo-US Subcommission on S&T; on infectious diseases, blindness prevention, reproductive physiology, molecular biology, pharmacology, child health and development, mental health, substance abuse, longitudinal, demographic and health trends. Termination date: Indefinite. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Initiative
EIF DATE: 01/31/83 **TERM DATE:** / /
REMARKS: Agreement by President Reagan & Prime Minister Gandhi to launch the Science & Technology Initiative (STI) on 7/28/82; initiative implemented Oct. 83; renewed for 3 years Oct. 85 and Oct 88; covers the fields of health, agriculture, monsoons, solid state science and engineering, and the SSC. Funding not specified.

INDONESIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/87 **TERM DATE:** / /
REMARKS: Cooperative research on peat studies as modern analogs of U.S. coal fields. Continuing agreement. USGS funding: $5,000.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. CDC Field Epidemiology Training Program. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 10/01/79 **TERM DATE:** 10/05/89
REMARKS: Agreement on cooperation in scientific research and technological development; individual cooperating agencies negotiate funding with counterpart agencies.

IRELAND

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agricultural S&T, forage/livestock management, extension, food technology, agribusiness promotion. Unsigned, under negotiations. Funding not specified.

ISRAEL

AGENCY: DOC (NOAA) **SUBJECT:** Marine Science
EIF DATE: 06/05/89 **TERM DATE:** 06/05/94
REMARKS: MOU for marine and freshwater cooperation. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: 12/14/87 **TERM DATE:** 12/13/97
REMARKS: MOU between Israel and the U.S. concerning the principles governing mutual cooperation in R&D, scientist and engineer exchange, and procurement and logistic support of defense equipment. Funding not specified.

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Israel and the U.S. Navy. Concerns applied oceanography. Defense Record No. 537. Funding not specified.

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Israel and the U.S. Navy. Concerns applied oceanography. Defense Record No. 541. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Physics)
EIF DATE: 05/27/87 **TERM DATE:** 05/27/92
REMARKS: Cooperation in high energy physics, applied mathematical sciences, and other basic energy sciences. DOE record No. 205. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 06/03/84 **TERM DATE:** 06/03/90
REMARKS: General bilateral agreement for the purpose of establishing wider cooperation in the field of energy research & development. DOE record No. 144. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 05/01/85 **TERM DATE:** 05/01/95
REMARKS: Global Digital Seismic Network. Funding not specified.

Appendix I: ISRAEL

AGENCY: DOI (BUREC) **SUBJECT:** Natural Resources
EIF DATE: 06/01/84 **TERM DATE:** 05/22/94
REMARKS: S&T exchange program in water resources with the Ministry of Agriculture; joint funding.

AGENCY: DOI (BUREC) **SUBJECT:** Natural Resources
EIF DATE: 02/08/90 **TERM DATE:** 02/07/95
REMARKS: S&T exchange program in water resources with the Israel Oceanographic and Limnological Research, Ltd.; joint funding.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 11/12/74 **TERM DATE:** / /
REMARKS: Ongoing. Transportation planning and information systems; and urban transport, including traffic control systems. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/06/85 **TERM DATE:** 01/08/94
REMARKS: MOU Agreement with the Israeli Ministry of Health; covers areas of health manpower and services, health services delivery, health information system, food and drugs, public health and biomedical research. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 03/01/83 **TERM DATE:** 03/01/90
REMARKS: Activities are under a Plan for Mutual Cooperation with the Ministry of Labor and Social Affairs in the areas of alcohol abuse and alcoholism; covers mutually beneficial exchanges, work-study programs, and joint studies. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/19/78 **TERM DATE:** 07/11/93
REMARKS: Information exchange and general technical cooperation with AEC. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 05/28/85 **TERM DATE:** 05/28/90
REMARKS: MOU signed by NCRD/NSF 5/85 for personnel and information exchanges in basic and applied sciences; program presently is supporting annual workshops on subjects of mutual interest to science community. Further extension under review. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 10/25/77 **TERM DATE:** / /
REMARKS: Funding not specified.

ITALY

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Italy and the U.S. Air Force. Concerns nondestructive evaluation (NDE) of composites. Defense Record No. 162. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 12/05/85 **TERM DATE:** 12/05/90
REMARKS: Bilateral agreement for purpose of establishing wider cooperation in field of energy R&D. This MOU replaces the MOU between the same parties which expired in 1979. A separate MOU for information exchange was signed. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Renewable)
EIF DATE: 06/03/75 **TERM DATE:** 06/03/90
REMARKS: Collaboration in geothermal R&D to include hot dry rock, brine utilization and deep drilling methods. DOE record No. 19. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 11/06/85 **TERM DATE:** 11/05/90
REMARKS: Program under S&T umbrella agreement; development and installation of digital real-time seismographs; hydrological hazards workshop; development of new technology. $97,000 GOI and other funding. Renewal for 5-yr. period effective 11/5/90 being pursued.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 06/07/84 **TERM DATE:** 06/07/89
REMARKS: Installation of digital real-time seismography. In renewal process for another 5 years, effective 06/07/89. Funding not specified.

Appendix I: ITALY

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 12/01/83 **TERM DATE**: 11/30/88
REMARKS: MOU renewal for 5 years period, effective 12/1/88, sent to Italy in 1989 for signatures; but presently unsigned. Original agreement refers to cooperative activities related to marine sediment transport and hydrologic and hazard seminars. Funding not specified.

AGENCY: DOT **SUBJECT**: Transportation
EIF DATE: 04/12/85 **TERM DATE**: 04/12/90
REMARKS: Initial areas of mutual interest: a) Containerization, b) Major infrastructure construction technology, c) Emergency transportation, d) Transportation safety, and e) Intermodal freight transportation. Replaces MOU of 10-03-69. Funding not specified.

AGENCY: DOT **SUBJECT**: Transportation
EIF DATE: 10/03/69 **TERM DATE**: / /
REMARKS: On-going agreement. Funding not specified.

AGENCY: EPA **SUBJECT**: Environment
EIF DATE: 03/01/87 **TERM DATE**: / /
REMARKS: Self-renewing MOU between EPA and the Italian Ministry of the Environment; priority areas include hazardous and municipal solid waste management, environmental technologies, accident prevention and research. Funding not specified.

AGENCY: HHS **SUBJECT**: Biomedical Sciences
EIF DATE: 11/21/77 **TERM DATE**: / /
REMARKS: MOU between HHS and the Italian Ministry of Health in health and biomedicine, renewable every 3 yrs, covers environmental health, cardiovascular and pulmonary diseases, cancer, biomedical communication, infectious disease, immunizations. Funding not specified.

AGENCY: HHS **SUBJECT**: Biomedical Science
EIF DATE: 08/02/68 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. Exchange of information. Interlibrary exchange. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 02/13/89 **TERM DATE:** / /
REMARKS: MOU between the National Research Council of Italy and NASA for cooperative development and the launch of the Lageos-2/IRIS Space Shuttle mission. Expires one year after completion of joint mission. Funding is NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 03/13/86 **TERM DATE:** / /
REMARKS: MOU between the National Research Council of Italy and NASA for the joint development of a Tethered Satellite System(TSS) for use with the NASA Space Shuttle. Termination will occur one year after completion of joint mission. Funding is NASA programmatic.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 04/03/89 **TERM DATE:** 04/03/93
REMARKS: International piping integrity research with ENEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 01/23/86 **TERM DATE:** 01/23/91
REMARKS: Thermal hydraulic research with ENEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 12/23/82 **TERM DATE:** 06/05/91
REMARKS: Severe accident, source termination, and containment research with ENEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/29/75 **TERM DATE:** 09/28/93
REMARKS: Information exchange and general technical cooperation with ENEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 12/22/88 **TERM DATE:** 09/30/93
REMARKS: Safety and Licensing of Future Nuclear Power Plants with ENEA. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/19/67 **TERM DATE:** 04/01/93
REMARKS: Projects under S&T umbrella agreement; provides for joint research, seminars & workshops; information & personnel exchanges. NSF counterpart is the Italian National Research Council. Department of State and Italian Foreign Ministry-lead agencies. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 04/01/88 **TERM DATE:** 04/01/93
REMARKS: Agreement for S&T cooperation; agreement contains intellectual property provisions; individual cooperating agencies negotiate funding with counterpart agencies.

JAPAN

AGENCY: DOC (NIST) **SUBJECT:** Telecommunications
EIF DATE: 09/14/89 **TERM DATE:** 09/13/94
REMARKS: Agreement is with the Nippon Telegraph and Telephone Corporation which is a private corporation; joint research on semiconductors, telecommunications, computers and computer networking, time and frequency measurements, and related fields. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 08/11/83 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 12/18/89 **TERM DATE:** 12/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Marine Science
EIF DATE: 01/01/64 **TERM DATE:** / /
REMARKS: US-Japan Cooperative Program in Natural Resources: Joint multidisciplinary research projects; information and data exchange. Funding not specified.

Appendix I: JAPAN

AGENCY: DOD **SUBJECT:** Technology Transfer
EIF DATE: 03/08/54 **TERM DATE:** / /
REMARKS: Mutual defense assistance agreement is basis for activities of Embassy's mutual defense assistance office and for later agreements for the transfer of technology. Renewable every 10 yrs. automatically, unless either party declines. Funding not specified.

AGENCY: DOD **SUBJECT:** Technology Transfer
EIF DATE: 01/01/85 **TERM DATE:** / /
REMARKS: 3 Agreements allowed Japanese military technology to be transferred to the U.S.--2 were shipbuilding-related technologies, 1 dealt with the Keiko-SAM missile(not transferred due to restrictions with Toshiba), 1 dealt with FSX technology. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 01/31/79 **TERM DATE:** 01/31/90
REMARKS: Cooperation in the design, development, construction and operation of liquid metal fast breeder reactors. DOE record No. 39. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 12/03/86 **TERM DATE:** 12/03/96
REMARKS: Study topics and develop cooperatively and jointly technology and techniques necessary for the safe management of radioactive wastes. DOE record No. 193. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: / / **TERM DATE:** / /
REMARKS: By Memoranda and Contracts cooperation ranges from studying responses to radiation at the Radiation Effects Research Foundation at Hiroshima and Nagasaki, to high energy physics and fusion research. Also, clean coal tech, solar energy. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 07/01/89 **TERM DATE:** 07/01/94
REMARKS: Contract with Central Research Institute of the Electric Power Industry of Japan to facilitate CRIEPI's participation in DOE's ongoing pyroprocessing development efforts of its integral fast reactor program. Funding not specified.

Appendix I: JAPAN

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 11/01/86 **TERM DATE:** 11/01/91
REMARKS: Exchange; US-Japan agreement on development and utilization of natural resources; US-Japan Panels: Natural areas, conservation, recreation and parks, city parks and urban affairs. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/28/88 **TERM DATE:** 10/28/91
REMARKS: Debris flow research; experimental studies of bedform alignment related to sediment transport studies on the continental shelves and in estuaries. Japan provides approximately $37,800.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/25/85 **TERM DATE:** 10/28/91
REMARKS: Geothermal and mineral resources research; advise GOJ on design of thermal-infrared multispectral imaging instrument. USGS funding: $38,000; NASA $35,600.

AGENCY: DOI (BLM) **SUBJECT:** Natural Resources
EIF DATE: 10/24/68 **TERM DATE:** / /
REMARKS: United States/Japan Natural Resources (UJNR) Forestry Panel--Exchange scientific and technical information concerning utilization and enhancement of forest products. No funding specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 07/31/69 **TERM DATE:** / /
REMARKS: Ongoing. Major areas are: Urban systems; traffic management; high speed rail, including magnetic levitation; aviation R&D; environment control strategies. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 08/05/75 **TERM DATE:** / /
REMARKS: Self-renewing governmental agreement includes 14 cooperative projects dealing with sewerage treatment, water conservation and flow reduction, air pollution related meterology, and photochemical air pollution. Funding not specified.

Appendix I: JAPAN

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 04/01/65 **TERM DATE:** / /
REMARKS: Termination date indefinite. US-Japan Cooperative Medical Sciences Program; projects divided into 9: Cholera and like diarrheas, immunology, leprosy/Hansen's Disease, malnutrition, parasitic diseases, tuberculosis, viral diseases, environmental mutagenesis and carg, v.hepetitis. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 04/01/76 **TERM DATE:** 01/01/91
REMARKS: Vision research; agreement between the National Eye Institute and the Japan Society for the Promotion of Science. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE:** 11/14/92
REMARKS: Gerontology research; agreement between the National Institute on Aging and Tokyo Metropolitan Institute of Gerontology. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/84 **TERM DATE:** 05/01/94
REMARKS: N.C.I. and Japan Society for the Promotion of Science for cooperation in the area of cancer research. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement; quid pro quo interlibrary exchanges. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/80 **TERM DATE:** 06/01/93
REMARKS: Projects under non-energy umbrella S&T agreement; exchanges, work-study programs, joint research; covers cardiovascular diseases, laboratory animals, toxicology, recombinant DNA, vaccine development, antiviral agents, and alcohol-related problems. Funding not specified.

Appendix I: JAPAN

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE:** 01/01/91
REMARKS: Agreement between NIH/NEI and the Japan Society for the Promotion of Science on vision research. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 09/05/89 **TERM DATE:** / /
REMARKS: Entering Phase C/D of Space Station Program; detailed Design and Development; total funding with international partners in excess of $7.0 billion; Japanese hardware accounting for $2 billion.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/28/88 **TERM DATE:** / /
REMARKS: Direct reception of data from Japan's JERS-1 spacecraft at a NASA receiving station. Agreement in force up to 1 year after technical lifetime of JERS-1. Funding not specified.

AGENCY: NASA **SUBJECT:** Space & Aeronautics
EIF DATE: 01/24/85 **TERM DATE:** 01/01/90
REMARKS: Use of Japanese airport for Shuttle emergency landing. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/30/74 **TERM DATE:** 12/31/90
REMARKS: Information exchange with STA and ANRE, and general technical cooperation. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/84 **TERM DATE:** 01/31/92
REMARKS: ROSA IV LWR safety research agreement on small break LOCAs and transients. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 11/07/84 **TERM DATE:** 11/06/89
REMARKS: Radioactive waste management. Expired, and new agreement under discussion. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/13/83 **TERM DATE:** 12/31/90
REMARKS: Severe fuel damage and fission product source term research with JAERI. Funding not specified.

Appendix I: JAPAN

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/09/87 **TERM DATE:** 10/08/92
REMARKS: Development and application of Nuclear Safety Analysis Computer Codes with ANRE/JINS. Funding not specified.

AGENCY: NSF **SUBJECT:** Computer Science
EIF DATE: 04/01/87 **TERM DATE:** / /
REMARKS: Ongoing. Establishes exchange program. Funding: variable, $70,000 to date.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/01/88 **TERM DATE:** 06/01/93
REMARKS: Seminars and workshops; long-term joint research visions; short-term project development visits; annual seminars identify joint priorities. IPR under investigation. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/01/63 **TERM DATE:** 06/01/93
REMARKS: Seminars and workshops; long-term joint research visits; short-term project development visits; annual seminars identify joint priorities. Renewal automatic unless parties refuse. Funding not specified.

AGENCY: NSF **SUBJECT:** Computer Science
EIF DATE: 06/01/86 **TERM DATE:** / /
REMARKS: MOU with the Japanese Institute for new generation computer technology (ICOT). Establishes exchange program where NSF pays for up to 3 researchers per year.

AGENCY: NSF **SUBJECT:** Basic Science
EIF DATE: 06/01/88 **TERM DATE:** / /
REMARKS: MOU with the Agency of Industrial Science and Technology (AIST) to send up to 30 researchers per year to AIST labs for 6-12 month stays. Renewable every 5 years if both parties concur.

AGENCY: NSF **SUBJECT:** Energy
EIF DATE: 10/05/81 **TERM DATE:** / /
REMARKS: Renewed Feb, 1990. Umbrella energy agreement, includes a protocol on photosynthesis and photoconversion research which NSF administers, and DOE co-implements. Funding not specified.

AGENCY: US Gov **SUBJECT**: S&T Umbrella
EIF DATE: 06/20/88 **TERM DATE**: 06/20/93
REMARKS: Agreement on cooperation and development in science and technology; joint R&D in all areas of S&T, except energy, and cooperation in developing S&T policies of the two countries; individual cooperating agencies negotiate funding with counterpart agencies.

AGENCY: US Gov **SUBJECT**: S&T Umbrella
EIF DATE: 01/01/75 **TERM DATE**: 01/01/91
REMARKS: 1975 bilateral environmental agreement and 1988 umbrella S&T agreement (UJST) offers cooperation in facilitating transfer of Japanese technology, statistics, analytical techniques. 14 panels operate under 1975 agreement, Japan proposed another for global atmosphere. Funding not specified.

JORDAN

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 09/01/82 **TERM DATE**: 01/31/91
REMARKS: Seismic network program, remote sensing; funded by USAID at $263,000.

KENYA

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 04/01/90 **TERM DATE**: 03/31/91
REMARKS: Kenya International Seismic Project investigates deep seismic structures of the East African Rift. USGS funding: $52,000; NSF: $37,000.

AGENCY: HHS **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/79 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. Malaria research by the Centers for Disease Control and collaborating Kenyan agencies. Funding not specified.

KOREA

AGENCY: DOC (NIST) **SUBJECT:** Metrology
EIF DATE: 06/01/86 **TERM DATE:** 06/01/89
REMARKS: Renewal underway; agreement with Korea's Standards Research Institute to improve knowledge and engineering practices in measuring mechanical properties of materials at low temperatures; low pressure measurement techniques. Active. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 03/01/77 **TERM DATE:** 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves South Korea and the U.S. Army. Concerns material technology. Defense Record No. 1022. Funding not specified.

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves South Korea and U.S. Navy. Concerns oceanography. Defense Record No. 579. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 11/06/11 **TERM DATE:** 11/06/91
REMARKS: Cooperation in the broad area of energy conservation. DOE record No. 94. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 11/06/81 **TERM DATE:** 10/08/91
REMARKS: Exchange of coal related information; personnel exchange and consultation in coal technology. DOE record No. 96. Funding not specified.

Appendix I: KOREA

AGENCY: DOE **SUBJECT:** Energy (Renewable)
EIF DATE: 11/06/81 **TERM DATE:** 11/06/91
REMARKS: Cooperation in all phases of solar energy research. DOE record No. 95. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/01/89 **TERM DATE:** 09/01/93
REMARKS: Cooperative research on origin and evolution of marine minerals, joint research cruises, exchange visits and laboratory analyses. USGS funding: $250,000.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: / / **TERM DATE:** / /
REMARKS: An MOU between EPA and the Korean Environment Agency was agreed to in November 1987. The agreement has not been implemented because IPR issues have held up the signing of the formal US-ROK agreement. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/18/76 **TERM DATE:** 11/10/86
REMARKS: Information exchange and general technical cooperation with MOST; renewal under negotiation. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 08/23/84 **TERM DATE:** 12/27/90
REMARKS: Severe accident, source term, and containment research with KAER I. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/01/86 **TERM DATE:** 05/01/91
REMARKS: Thermal hydraulic research with KAER I. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 05/24/87 **TERM DATE:** 05/24/92
REMARKS: NSF-KOSEF MOU under S&T umbrella; joint research, seminars, and workshops; long-term joint research visits; short-term project development visits; annual seminars identify joint priorities. IPR under negotiation. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Science and Engineering
EIF DATE: 05/24/77 **TERM DATE:** 05/24/92
REMARKS: MOU renewed in 1982 and 1987; Renewable every 5 years. When S&T umbrella agreement is renegotiated and signed, MOU under IPR protection. Joint research, seminars, and workshops; long-term joint research visits; short-term project development. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 11/22/76 **TERM DATE:** 10/01/88
REMARKS: Agreement relating to scientific and technical cooperation; negotiations currently underway on renewal of the agreement; individual cooperating agencies negotiate funding with counterpart agencies.

KUWAIT

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 12/04/88 **TERM DATE:** 12/31/93
REMARKS: No activities in FY 1990. Funding not specified.

LIBERIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/20/86 **TERM DATE:** 03/20/91
REMARKS: No activity in FY 1990. No funding specified.

MAURITANIA

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/11/87 **TERM DATE:** 01/11/92
REMARKS: No activity in FY 1990. Funding not specified.

MEXICO

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 06/24/88 **TERM DATE:** 11/30/89
REMARKS: A MOU for the exchange of scientific and economic data and information on the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries (Gulf)
EIF DATE: 11/19/86 **TERM DATE:** 11/30/89
REMARKS: A MOU for cooperative research on shared resources in the Gulf of Mexico for the exchange of scientific information and cooperative research on the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries (Pacific)
EIF DATE: 11/19/86 **TERM DATE:** 11/30/89
REMARKS: A MOU for cooperative research on shared resources in the Pacific and for the exchange of scientific information and cooperative research in the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

AGENCY: DOC (CENSUS) **SUBJECT:** Statistics
EIF DATE: 03/27/86 **TERM DATE:** 03/27/91
REMARKS: An important joint training program of Latin America is just beginning; will be formalized in an annex to agreement. Activity level: Low end of moderate. This cooperation agreement provides for exchange of methodology, documents, information. No funding specified.

AGENCY: DOE **SUBJECT:** Environment
EIF DATE: 07/19/90 **TERM DATE:** 07/19/94
REMARKS: Agreement of Los Alamos National Lab and the Mexican Petroleum Institute to exchange technical information and cooperate in the analysis of aire qulity and alternative energy strategies for improving air quality in the Mexico City Basin. U.S. contribution up to $4.5 million; Mexican funding $4.5 million.

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 06/20/83 **TERM DATE:** 06/20/90
REMARKS: Exchange information and develop basic and applied research programs in petroleum technology. DOE record No. 125. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Renewable)
EIF DATE: 04/07/86 **TERM DATE:** 04/07/94
REMARKS: To develop an understanding of geothermal reservoirs in sedimentary and fractured igneous rocks. DOE record No. 178. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** National Parks
EIF DATE: 11/30/88 **TERM DATE:** 11/30/93
REMARKS: Mutual objectives/interests declared in the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere of 10-20-40, World Heritage/cross border resource issues. No funding specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/31/89 **TERM DATE:** 03/31/94
REMARKS: Scientific cooperation and exchange in geothermal and related volcanic investigations. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 07/01/90 **TERM DATE:** 07/01/91
REMARKS: Use of PCs for change detection and map revision with satellite data. US-Mexico S&T Agreement ($25,000) and USGS-CETENAL MOU & DMA IAGS. USGS funding: $4,000, .05 FTE.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 08/26/90 **TERM DATE:** 08/01/91
REMARKS: Research programs in seismology with National University of Mexico. USGS funding: $47,000; Mexico: $1,800.

AGENCY: DOI (BLM) **SUBJECT:** Natural Resources
EIF DATE: 01/01/61 **TERM DATE:** / /
REMARKS: The North American Forestry Commission exchanges information and advise the FAO Committee on Forestry concerning forest and wildfire management practices. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 03/16/88 **TERM DATE:** / /
REMARKS: Tripartite cooperation on waterfowl and wetlands conservation. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 05/12/84 **TERM DATE:** 05/11/94
REMARKS: Cooperative projects on endangered migratory birds, law enforcement, training, and other wildlife matters. Funding not specified.

Appendix I: MEXICO

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 06/01/89 **TERM DATE:** / /
REMARKS: Ongoing agreement between the USCG and the Government of Mexico for cooperation in maritime search and rescue. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 11/16/72 **TERM DATE:** / /
REMARKS: Major areas for cooperation include highway, rail, oil pollution control, and border congestion. Ongoing agreement. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 08/07/89 **TERM DATE:** / /
REMARKS: Ongoing agreement between the USCG and its Mexican counterpart on cooperation in maritime search and rescue. Communication annex to this agreement has been drafted and is pending approval by both governments. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 08/14/88 **TERM DATE:** / /
REMARKS: US-Mexican governmental agreement for cooperation in the protection, improvement and conservation of the border environment. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 10/04/89 **TERM DATE:** / /
REMARKS: Agreement to protect and improve the environment in Mexico City focusing initially on air quality, water quality, waste management, health aspects of environmental pollution, and sustainable development. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 01/01/83 **TERM DATE:** / /
REMARKS: Governmental agreement for cooperation in the protection, improvement and conservation of the border environment. Currently developing joint strategy to limit transboundary air pollution in the El Paso/Ciudad Juarez area. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** 12/31/90
REMARKS: Field epidemiology training by the Centers for Disease Control with the Secretaria de Salud. Funding not specified.

Appendix I: MEXICO

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/30/76 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with Centro Nacional de Informacion y Documentacion en Salud (CENIDS); quid pro quo interlibrary exchange. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** 11/01/92
REMARKS: Plan for scientific cooperation between NIH and Center for Research and Advanced Studies, National Polytechnic Institute, Mexico (CINVESTAV IPN); covers neurosciences and endocrinology, neurobiology and anaesthesiology, molecular aging, and liver metabolism. Funding not specified

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 04/08/81 **TERM DATE:** 10/06/94
REMARKS: Information exchange and technical cooperation with CNSNS. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/02/87 **TERM DATE:** 06/02/92
REMARKS: General safety research umbrella agreement with CNSNS. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/15/72 **TERM DATE:** / /
REMARKS: Ongoing. Projects under S&T umbrella agreement; information and personnel exchanges; joint research; seminars, workshops, and meetings. Department of State and Mexican Foreign Ministry are lead agencies. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 06/15/72 **TERM DATE:** / /
REMARKS: Agreement for S&T cooperation; individual cooperating agencies negotiate funding with counterpart agencies; restructuring of bilateral mixed commission in 1988 to deal with policy and coordination issues only.

MOROCCO

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/01/87 **TERM DATE:** 01/01/97
REMARKS: Use of Moroccan air base as a Space Shuttle emergency landing site. Funding not specified.

MOZAMBIQUE

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Mozambique and the U.S. Navy. Concerns oceanographic acoustic research. Defense Record No. 1189. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 04/10/86 **TERM DATE:** 04/09/91
REMARKS: No activity in FY 1990. Funding not specified.

MULTILATERAL

AGENCY: DOC (NIST) **SUBJECT:** Materials Science
EIF DATE: 05/01/87 **TERM DATE:** 04/30/92
REMARKS: International accord with France, UK, Italy, Canada, Japan, Germany, and the Commission of European Communities; participation in the Versailles Project on Advanced Materials (VAMAS); NIST represents U.S. cooperation deals with prestandards measurements. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 09/01/88 **TERM DATE:** / /
REMARKS: Search and Rescue Satellite System; 15 year agreement including U.S., USSR, France and Canada. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Fisheries
EIF DATE: 06/01/77 **TERM DATE:** 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis; conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 02/23/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEP. Involves Canada, the United Kingdom, Australia, and the U.S. Navy. Concerns non-metallic materials/corrosion control. Defense Record No. 431. Funding not specified.

AGENCY: DOD **SUBJECT:** Chemistry
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns modelling and analytical chemistry defense system. Defense Record No. 369. Funding not specific.

AGENCY: DOD **SUBJECT:** Aeronautics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, Australia, New Zealand, United Kingdom, and the U.S. Concerns maneuvering aerodynamics. Funding not specified. Defense Record No. 717.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns metals. Defense Record No. 744. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns ceramics. Defense Record No. 745. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns organic materials. Defense Record No. 746. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns materials performance. Defense Record No. 747. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, Australia, New Zealand, United Kingdom, and the U.S. Concerns nondestructive test. Defense Record No. 748. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns electronic materials. Defense Record No. 749. Funding not specified.

AGENCY: DOD **SUBJECT:** Aeronautics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns aeronautics. Defense Record No. 714. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns materials. Defense Record No. 743. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns communications technology and information system. Defense Record No. 765. Funding not specified.

AGENCY: DOD **SUBJECT:** Behavioral Sciences
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns behavioral sciences. Defense Record No. 769. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns computing technology. Defense Record No. 82. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns communication network architecture. Defense Record No. 766. Funding not specified.

AGENCY: DOD **SUBJECT:** Space
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns space communications. Defense Record No. 767. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns machine intelligence. Defense Record No. 786. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns digital logic design. Defense Record No. 787. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns trusted computer system. Defense Record No. 783. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns software engineering. Defense Record No. 784. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns machine and system architecture. Defense Record No. 785. Funding not specified.

AGENCY: DOD **SUBJECT:** Avionics
EIF DATE: 09/24/88 **TERM DATE:** / /
REMARKS: Agreement with Germany, France, United Kingdom, and the U.S. Encompasses 3 bilateral projects. Development of 32- and 16-bit processing modules, high speed data business modules, a video processing module and system couplers. MOU with France signed; one with United Kingdom and Germany under review. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-AGARD, involving NATO and DOD. Concerns structures and materials panel. Defense Record No. 388. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 02/01/90 **TERM DATE:** 02/01/95
REMARKS: Bilateral umbrella energy research agreement was renewed for 5 years. Discussions continued through 1990 to develop arrangements for the transport to Japan of the plutonium recovered from reprocessing in the United Kingdom and France. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 02/05/67 **TERM DATE:** 09/30/91
REMARKS: Technical assistance; national park development; participants include African countries. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 06/21/84 **TERM DATE:** 05/31/94
REMARKS: Policy coordination; World Heritage Site nomination; cultural resource cooperation with ICOMOS; participation with World Heritage Convention countries in cooperative programs of site assistance and staff training. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 09/22/86 **TERM DATE:** 09/22/91
REMARKS: Peace Corps Volunteer training in national parks and conservation; participants include Malawi, Morocco and Sierre Leone; other U.S. government funding of $18,000.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 10/12/40 **TERM DATE:** / /
REMARKS: Ongoing. Western Hemisphere Convention 1/18/90 S.P.A.W. Protocol. Technical assistance; participants include Argentina, Barbados, Bermuda, Brazil, British Virgin Islands, Chile, Colombia, Costa Rica, Grenada, Jamaica, Mexico, Panama, Peru, St. Vincent and the Grenadines. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 03/09/84 **TERM DATE:** 03/09/90
REMARKS: Technical assistance/information exchange; Man and the Biosphere (MAB) Program; includes Canada, Mexico, Rwanda, Germany and all MAB countries; US Government funding of $30,500.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/66 **TERM DATE:** / /
REMARKS: Acquisition of geodetic and gravity data; aerial photography; satellite imagery and production of maps. SCAR Library for Geodesy and Geographic Information. USGS: $40,000, 8.5 FTE. NSF: $60,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Continuing agreement. SW and W. Pacific: One USGS employee in Fiji for advice and training in marine geoscientific hydrocarbon studies and coastal geological hazards and resources. USGS funding: $70,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Continuing agreement. Circum-Pacific Map Project: Coordination & cartographic preparation of 60 thematic maps. USGS funding: $350,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 08/01/86 **TERM DATE:** 07/31/91
REMARKS: Interagency Volcano Early Warning Disaster Assistance Program provides emergency response to volcano crises. USAID funding: $170,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/72 **TERM DATE:** / /
REMARKS: Antarctic glaciological studies, seismology and ultra-long period gravity investigations; data telecommunications at the South Pole. USGS funding: $16,000, 3.2 FTE. Outside support: $16,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/01/87 **TERM DATE:** 09/01/91
REMARKS: Famine Early Warning System; development and application of information system technology for target populations in 7 African countries. USAID funding: $450,000, 4.0 FTE.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/88 **TERM DATE:** / /
REMARKS: International Strategic Minerals Inventory: Global Inventory of Strategic Commodities including cobalt, nickel, platinum and titanium. Participants are from Australia, Canada, South Africa, United Kingdom, and West Germany. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/01/86 **TERM DATE**: / /
REMARKS: Advisory consultations to various intergovernmental geoscience bodies in eastern Asia, particularly in resource assessment methodologies; preparation of regional base maps at 1:2,000,000-scale; about $5,000 in travel funds from the Department of State.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 04/01/88 **TERM DATE**: 09/30/91
REMARKS: Remote sensing and information systems for research and monitoring of Sahelian Africa for meterology, hydrology, and agriculture in 8 African countries. USAID funding: $1,700,000.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/01/89 **TERM DATE**: 12/31/89
REMARKS: USGS provides technical expertise to UN agencies as requested. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 04/01/87 **TERM DATE**: 09/30/91
REMARKS: Time series monitoring of vegetation conditions of locust habitat in 8 African countries and Saudi Arabia. USAID funding of $200,000, 2.0 FTE.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 01/01/80 **TERM DATE**: / /
REMARKS: Continuing agreement. USGS-Air Force Technical Applications Center Program of seismic data collection in New Zealand, Africa and South America. AFTAC Funding: $100,000, 4mm.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 12/31/87 **TERM DATE**: 12/31/90
REMARKS: Geothermal resources assessment of Central America. USAID funding: $27,000.

AGENCY: DOI (USGS) **SUBJECT**: Earth Sciences
EIF DATE: 05/30/90 **TERM DATE**: 05/30/92
REMARKS: Training in investigation of gold/silver deposits in Bolivia, Chile, and Peru. IDB Funding: $50,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/01/89 **TERM DATE:** 11/30/90
REMARKS: Worldwide earthquake risk management program: Pilot program in Morocco, Chile and Indonesia. USAID funding: $47,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 11/01/81 **TERM DATE:** / /
REMARKS: Continuing agreement. International Strategic Mineral Inventory: Global inventory of strategic commodities including cobalt, nickel, platinum, titanium, and lithium. Participants: the U.S., Australia, Canada, South Africa, United Kingdom, and Germany. USGS funding: $60,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/86 **TERM DATE:** 12/31/90
REMARKS: USGS/New Zealand and 1:50,000-scale topographic mapping in Dry Valley area of Antarctica. USGS funding: $8,000, 1.0 FTE. NSF: $50,000.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 11/01/87 **TERM DATE:** 01/31/92
REMARKS: Field Research at lakes in dry valleys related to global carbon cycle in Antarctica. NSF grant.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 01/01/87 **TERM DATE:** / /
REMARKS: Training and research in 13 Near East countries; 12 grants in support of biological diversity. USAID funding at $186,000.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 04/30/42 **TERM DATE:** / /
REMARKS: Institution building and training in western hemisphere countries; grants and projects in support of regional capabilities for managing wildlife, environmental education, graduate program development; and technical information data centers. Funding not specified.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 01/01/87 **TERM DATE:** / /
REMARKS: Training & research in 8 Asian countries; 8 grants in support of biological diversity; USAID funding at $260,000.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 01/01/70 **TERM DATE:** / /
REMARKS: Ongoing agreement. EUROCONTROL Group: Civil Aviation; management information exchanges on air navigation. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Federal Highway Administration (FHWA) participates in highway projects and technical database coordination. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: European Conference of Ministers of Transport (ECMT); various technical subjects; high-level policy discussions in Council Sessions. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: UN Economic Comission for Europe (ECE): Inland Transport Committee Groups of Experts on Construction of Vehicles (WP 29) & Road Safety (GE 20); Combined Transport (GE 24); Transport of Dangerous Goods (GE 15); Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. United Nations International Telecommunications Union (ITU): World Administrative Radio Conference for Mobile Services. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: International Union of Railways (UIC); information exchanges; committee projects on rail research; annual membership dues of $40,000 and $6000 travel expenses. Federal Railroad Administration (FRA) participates on Committee of 173 on rail contact fatigue. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Organization for Economic Cooperation & Development (OECD); DOT represented on Road Transport Research Program Steering Committee and active in selected research studies. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. United Nations International Atomic Energy Agency (IAEA): Standing Advisory Group on Safe Transport of Radioactive Material. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: United Nations Economic & Social Council: Committee of Experts on Transport of Dangerous Goods. Research and Special Program Administration (RSPA) participates in Committee. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: USCG continues active participation in UN's International Maritime Organization (IMO), representing the U.S. in meetings of UNGA, Maritime Safety Committee (MSC), Marine Environment Protection Committee (MEPC) Legal Committee. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Commission Internationale de L'Eclairage - Division 4 - Lighting and Signaling for Transport; development of technical reports, guidelines, and/or standards. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Maritime-special groups: International Association of Lighthouse Authorities; International Working Group on LORAN C; International Ship Structures Congress; International Radio Consultative Committee; Panama Canal Seminar on Tonnage System Changes; Seminars on Marine Pollution and Chemical Tankers and Gas. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Maritime Administration (MARAD) participates in Inter-American Port and Harbor Conferences. Agreement between DOT and OAS. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: In 1990 Permanent International Association of Road Congresses (PIARC) and FHWA have worked to upgrade PIARC's treatment of safety, environmental, advanced traffic management, and motor carrier issues. U.S. participation with PIARC technology experts good. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Pan American Highway Congress - Pan American Institute of Highways; training and technology transfer for highway construction to member countries. Funded by Pan American Highway Congress and member countries.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: 18th Pan American Railway Congress Association (PARCA) held in Rio de Janeiro. DOT's representative addressed issues on effects of pollution, congestion, and accidents in America as factors that can be mitigated by rail transport. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. United Nations International Civil Aviation Organization (ICAO); annual Assembly Meetings; 9 Regional Groups; 3 special committees; 13 Panels which have established various ad hoc study groups. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: USCG participates in technology and policy sharing with the Permanent International Association of Navigational Congresses (PIANC). MARAD contributed technical paper addressing critical issues and problems relating to maritime transportation. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** 09/01/91
REMARKS: International Collaborative effort on Perinatal and Infant Mortality with Denmark, Germany, Israel, Japan, Norway, Sweden and the United Kingdom by the National Center for Health Statistics/CDC. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 03/01/79 **TERM DATE:** 09/01/91
REMARKS: Child survival and combatting childhood communicable diseases; Centers for Disease Control program of training and logistics planning for advancement of childhood immunization programs in 21 countries. Funding not specified.

AGENCY: NASA **SUBJECT:** STSP (Space Physics)
EIF DATE: 11/30/89 **TERM DATE:** / /
REMARKS: MOU concerning Solar Terrestrial Research Program; to be extended by mutual agreement. Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** Spacelab
EIF DATE: 01/01/73 **TERM DATE:** 11/28/91
REMARKS: Procurement and use of a space laboratory in conjunction with the space shuttle system. Signed in 1973, Department of State has confirmation records. MOU funded by NASA programmatic.

AGENCY: NASA **SUBJECT:** ISEE (Space Physics)
EIF DATE: 03/17/75 **TERM DATE:** / /
REMARKS: International Sun/Earth Explorer program. MOU between ESA and NASA regarding solar terrestrial physics. Expiration is indefinite, as it will continue until terminated with 180 days' notice. Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 03/29/79 **TERM DATE:** 10/06/95
REMARKS: Ulysses; MOU on cooperative mission to study the poles of the sun between ESA and NASA. Formerly called the International Solar Polar Mission. Expires 5 years after launch (10/06/90). Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 10/07/77 **TERM DATE:** 04/24/01
REMARKS: Cooperative participation in the development and use of the Hubble Space Telescope. MOU between ESA and NASA to expire 11 years after launch (4/24/90). Renewal requires consultation one year prior to expiration. Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 09/29/88 **TERM DATE:** / /
REMARKS: MOU between ESA, NASA, Canada, and Japan on cooperation in the detailed design, development, operation and utilization of the permanently manned civil Space Station. Total Funding: $7 billion for all partners; ESA hardware accounting for $4 billion.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/14/86 **TERM DATE:** / /
REMARKS: Agreement for tracking and data reception for the ESA Earth Remote Sensing Satellite (ERS-1) at Fairbanks. Indefinite MOU in force through life of instruments. Renewable for 3 years' extension through exchange of letters. Funding: NASA programmatic.

AGENCY: NASA **SUBJECT:** IUE (Astronomy)
EIF DATE: 03/21/74 **TERM DATE:** / /
REMARKS: MOU between ESA and NASA on International Ultraviolet Explorer space astronomy mission. Expiration is indefinite, until terminated with 180 days notice. Funding: NASA programmatic.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 01/01/85 **TERM DATE:** 12/31/90
REMARKS: OECD Halden Reactor project. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 01/31/89 **TERM DATE:** 09/30/91
REMARKS: OECD Project to investigate the Three Mile Island 2 Reactor Pressure Vessel. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/30/88 **TERM DATE:** 09/29/90
REMARKS: 2D/3D Agreement. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/01/87 **TERM DATE:** 09/01/90
REMARKS: OECD Project on the International Alligator Rivers Analogue. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/19/79 **TERM DATE:** 09/20/89
REMARKS: EURATOM; nuclear safety research. Expired; extension under discussion. Funding not specified.

NETHERLANDS

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 09/28/77 **TERM DATE:**
REMARKS: Ongoing agreement concerning transportation economics studies; highway traffic safety, civil aviation; urban systems; drug testing stuides. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 06/17/85 **TERM DATE:** 06/17/90
REMARKS: Self-renewing (every 5 years) MOU with Ministry of Housing, Physical Planning and Environment; includes work on integrated planning, enforcement, air quality, economic incentives, water quality. EPA and the Ministry co-sponsor symposia on air-related enforcement. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/01/87 **TERM DATE:** 08/31/91
REMARKS: Nuclear Reactor Safety Research with ECN. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/03/77 **TERM DATE:** 09/23/92
REMARKS: Information exchange and general technical cooperation with NMSAE. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 11/20/80 **TERM DATE:**11/20/90
REMARKS: Agricultural S&T; plant physiology, economic research; integrated pest management; etc. Funding not specified.

NEW ZEALAND

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 06/23/86 **TERM DATE:** / /
REMARKS: Joint USGS-New Zealand project to do 1:50,000 scale mapping of regions of high scientific interest in McMurdo Sound area of Antarctica; funded by NSF at $50,000. USGS completed its work on the first 5 sheets which were sent to New Zealand for compilation.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/14/90 **TERM DATE:** 01/14/91
REMARKS: Cooperation in structural geology and tectonics with Victoria University. Funding of $31,000 from Victoria University.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 07/01/89 **TERM DATE:** 02/01/90
REMARKS: Ongoing informal scientific cooperative study to develop models for caldera-forming eruptions. Program ongoing, depending on availability of funding.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 02/0[illegible]/74 **TERM DATE:** 02/01/91
REMARKS: Projects under S&T umbrella agreement; joint research; information and personnel exchanges; utilization of installations. IPR under negotiation; NSF counterpart is Ministry of Science, Research and Technology (MORST). Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 07/01/88 **TERM DATE:** 06/30/92
REMARKS: Projects under S&T umbrella agreement; joint research; information and personnel exchanges; utilization of installation. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 02/27/74 **TERM DATE:** 08/27/89
REMARKS: Agreement for S&T cooperation; individual cooperating agencies negotiate funding with counterpart agencies.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 11/29/83 **TERM DATE:** 11/29/88
REMARKS: Agricultural R&D; tree improvement; animal diseases surveillance systems. Renewal pending IPR approval. Funding not specified.

NIGERIA

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 09/22/90 **TERM DATE:** / /
REMARKS: MOU between Nigerian Ministry of Housing and Environment provides EPA assistance to the MHE when requested and based on domestic priorities. Government of Nigeria reimburses EPA for services.

NORWAY

AGENCY: DOD **SUBJECT:** Energy
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Norway, the U.S. Army and Navy. Concerns energy conversion. Defense Record No. 616. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Fossil)
EIF DATE: 04/22/87 **TERM DATE:** 04/22/92
REMARKS: Establish an exchange of S&T information regarding fossil energy R&D and conduct joint basic and/or applied fossil energy research projects. DOE record No. 199. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/04/88 **TERM DATE:** 02/04/93
REMARKS: Cooperation in developing methods for digital sonar image data with the Norwegian Institute of Technology. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/12/89 **TERM DATE:** 10/12/94
REMARKS: Cooperation with Geological Survey of Norway. No activity in FY 1990. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 07/17/75 **TERM DATE:** / /
REMARKS: Agreement for sounding rocket launches from Andoya, Norway. Funding not specified.

PAKISTAN

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 11/26/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 09/30/86 **TERM DATE:** 11/02/93
REMARKS: Technical assistance and training; national/cultural heritage conservation and management technical assistance; wildlife conservation training; operations are conducted under the auspices of the referenced agreement-there is no separate NPS agreement. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 08/07/85 **TERM DATE:** 07/31/89
REMARKS: Coal resources exploration and assessment. AID funding: $1,700,000.

AGENCY: DOI (FWS) **SUBJECT:** Natural Resources
EIF DATE: 01/01/78 **TERM DATE:** 12/01/92
REMARKS: Research in endangered species; training in wildlife management; conservation education. 1 of 3 Special Foreign Currency programs run by the FWS (Egypt,India) in which excess foreign currency is held by the FWS for use in conservation projects.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/01/86 **TERM DATE:** / /
REMARKS: Science cooperation under US-Pakistan S&T Agreement includes prevention of blindness, parasitic diseases, health stats, health services research, cancer, cardiovascular diseases, maternal and child health. Termination date Indefinite. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Science
EIF DATE: 03/02/81 **TERM DATE:** 05/31/89
REMARKS: Cooperative Science Program MOU with the Pakistan Ministry of Science and Technology; joint research, seminars and workshops; visits; supports attendance at international meetings; information and data exchanges; translation services. Pending renewal. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 12/06/82 **TERM DATE:** / /
REMARKS: Agreement to establish a Joint Commission on Economic, Commercial, Scientific, Technological, Educational and Cultural Cooperation. Funding not specified.

PARAGUAY

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 10/17/88 **TERM DATE:** 08/24/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

PERU

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/88 **TERM DATE:** / /
REMARKS: Active indefinitely. CDC Field Epidemiology Training Program. Funding not specified.

PHILIPPINES

AGENCY: HHS **SUBJECT**: Biomedical Sciences
EIF DATE: 06/01/87 **TERM DATE**: / /
REMARKS: Centers for Disease Control and Department of Health program in field epidemiology training (USAID funded). Termination date: Indefinite.

AGENCY: NRC **SUBJECT**: Nuclear Safety
EIF DATE: 04/28/80 **TERM DATE**: 06/18/90
REMARKS: Information exchange and general technical cooperation with AEC; Expired, and renewal being renegotiated. Funding not specified.

AGENCY: USDA **SUBJECT**: Agricultural Science
EIF DATE: 02/10/88 **TERM DATE**: 02/10/93
REMARKS: Agricultural S&T; cocoa production technology. Funding not specified.

POLAND

AGENCY: DOC (NIST) **SUBJECT**: Basic & Applied Sciences
EIF DATE: 09/29/87 **TERM DATE**: 09/28/92
REMARKS: NIST is one of several U.S. technical agencies cooperating under US-Polish agreement for S&T cooperation. The Maria Sklodowska-Curie Fund established as the funding vehicle; 9 active programs in FY90.

AGENCY: DOC (NOAA) **SUBJECT**: Fisheries
EIF DATE: 02/01/87 **TERM DATE**: 07/01/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT**: Natural Resources
EIF DATE: 09/01/87 **TERM DATE**: 09/01/92
REMARKS: Cooperation and exchange; natural and cultural heritage conservation and management; personnel; information exchange. Funding not specified.

Appendix I: POLAND

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 08/25/88 **TERM DATE:** 08/25/93
REMARKS: Projects on lignite formation; carbonatites and alkaline intrusions; prospecting for mineral deposits. USGS funding: $21,400; Joint Commission funding: $54,200.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 11/03/71 **TERM DATE:** / /
REMARKS: During 1990 $17,000 US in lab equipment provided to Polish collaborators in ongoing research. 3 visiting scientists supported during their U.S. visit by the TSC in Cambridge, MA. April 1990, joint 3-day seminar on research was hosted at Kracow Institute, Poland.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 09/10/87 **TERM DATE:** 09/10/92
REMARKS: EPA and the Ministry of Environment agreement on research, demonstration projects and workshops on environmental policy and management,water quality modeling, hazardous waste management, radionuclide migration in food chain, wastewater and air pollution work. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/01/84 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Agreement between HHS and the Polish Ministry of Health and Social Welfare; cooperation on mental health problems; cardiovascular and pulmonary diseases, individual health scientist exchanges, cancer research, mental health, and child health. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Science
EIF DATE: 10/08/87 **TERM DATE:** 10/08/92
REMARKS: Epidemiological, basic, and clinical investigations in the field of cancer. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/13/88 **TERM DATE:** 06/13/93
REMARKS: MOU under the 1987 S&T umbrella agreement provides for joint research projects, seminars and workshops, and short-term project development visits. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 09/28/87 **TERM DATE:** 09/28/92
REMARKS: Agreement established a joint commission and a joint fund with contributions from both sides after lapse of an earlier agreement signed in 1972; extensive language on protection of intellectual property. Funding not specified.

PORTUGAL

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 05/18/87 **TERM DATE:** 05/17/92
REMARKS: No activity in FY 1990. Funding not specified.

REGIONAL

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Regional highway technical assistance; transport planning and development in cooperation with USAID. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Civil aviation technical assistance in Cape Verde, Egypt, Liberia, and Morocco. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Highway technical assistance in Kuwait and Turkey. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Civil aviation technical assistance in Australia, Burma, Brunei, China, Hong Kong, ICAO, India, Indonesia, Israel, Japan, Jordan, Korea, Malaysia, Marshall Islands, The Maldives, Micronesia, Nepal, New Zealand, Oman, Pakistan, Palau, The Phillipines, etc. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Technical assistance to Saudi Arabia on transport system infrastructure establishment and training. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Civil aviation technical assistance in Austria, Belgium, Denmark, EUROCONTROL, Germany, France, Greece, Iceland, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, Switzerland, and the United Kingdom. Programs have various start and end dates. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Highway technical assistance in Indonesia. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Civil aviation technical assistance in Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Surinam, Uruguay, and Venezuela. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Ongoing. Highway technical assistance in Barbados and Costa Rica. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Civil aviation technical assistance in Barbados, Bahamas, Canada, the Cayman Islands, COCESNA, the Dominican Republic, Grenada, Guyana, Haiti, Iceland, Jamaica, Mexico, the Netherlands Antilles, the Organization of Eastern Caribbean States, Panama, Trinidad and Tobago. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Science
EIF DATE: 10/26/77 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. NIH/National Library of Medicine MEDLARS Agreement for interlibrary exchanges. Funding not specified.

ROMANIA

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 12/01/74 **TERM DATE:** / /
REMARKS: US-Romania cooperation and individual health scientist exchanges; renewable every two years. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 02/27/79 **TERM DATE:** 02/27/88
REMARKS: Joint workshops and seminars; short-term project development visits; joint research. Renewal pending. Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Funding not specified.

SAUDI_ARABIA

AGENCY: DOC (NOAA) **SUBJECT:** Atmospheric Sciences
EIF DATE: 02/01/75 **TERM DATE:** 08/10/90
REMARKS: Technical Cooperation Agreement; cooperation in integrating Saudi meteorological services and supporting research programs. Extension to be signed shortly will provide termination in 1995; operating with exchange of letters intent on 5 years' extension. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 09/25/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Renewable)
EIF DATE: 02/04/87 **TERM DATE:** 02/04/92
REMARKS: Finding solutions to mutually agreed on problems in renewable energy R&D. DOE record No. 197. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 01/01/63 **TERM DATE:** 12/31/94
REMARKS: Establishment of earth sciences organization; geographic and geologic cartography; mining; geologic, geochemical and geophysical studies; geologic and mineral resources database. Government of Saudi Arabia funding: $4,000,000.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 10/26/83 **TERM DATE:** / /
REMARKS: In 1990 total Transport Project team consisted of 7 employees with 4 professionals assigned to Riyadh. Budget of $1,600,000. Project trains 200 Saudi engineers in highway related topics; completed development of Quality Assurance Program, automated truck legislation.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/01/86 **TERM DATE:** 12/31/93
REMARKS: CDC field epidemiology training program. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/74 **TERM DATE:** 09/01/90
REMARKS: Under US-Saudi Joint Commission economic cooperation to enable sharing of knowledge and transfer of technology for food and drug control and emergency medical services. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 06/01/79 **TERM DATE:** 02/13/90
REMARKS: Umbrella project agreement in conjunction with US Treasury Department; institutional development; development of a national S&T information system, grants program and a national research institute; and science education. An exchange of letters have occurred.

SENEGAL

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/01/83 **TERM DATE:** 01/01/93
REMARKS: Use of Senegalese air field as a Space Shuttle emergency landing site. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/30/81 **TERM DATE:** 12/31/90
REMARKS: NASA tracking station in Senegal being extended for six years. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 08/17/82 **TERM DATE:** 08/01/87
REMARKS: Agreement for S&T cooperation. Funding not specified.

SIERRA LEONE

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Long-term agreement between Centers for Disease Control and Ministry of Health in joint research for viral hemorrhagic fevers. Funding not specified.

SOUTH AFRICA

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 10/19/83 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 12/01/87 **TERM DATE:** 12/01/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

SPAIN

AGENCY: DOD **SUBJECT:** Technical Cooperation
EIF DATE: 06/09/80 **TERM DATE:** / /
REMARKS: Provides for exchange of technical information related to development of weapons systems of mutual interest to the U.S. and Spain. Six annexes (fluids and lubricants, solid propellant, antenna design, mines, shipboard gun systems, proving grounds). Funding not specified.

Appendix I: SPAIN

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Spain and the U.S. Air Force. Concerns fluids and lubricants technology. Funding not specified.

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Spain and the U.S. Navy. Concerns oceanography and hydrography. Defense Record No. 623. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 06/06/86 **TERM DATE:** 06/06/91
REMARKS: Cooperation in R&D pertaining to nuclear waste management; renewable energy, including biomass, coal and gas technologies, conservation, high energy physics, and environmental impact of energy technology. DOE record No. 181. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 11/10/71 **TERM DATE:** / /
REMARKS: Transportation planning exchanges; concrete structure research; seismic effects on bridge deck systems; five projects were funded under the US-Spain Agreement of Friendship, Defense and Cooperation, and carried out by US universities. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Services
EIF DATE: 11/04/84 **TERM DATE:** / /
REMARKS: Allows PHS scientists to participate in the US-Spain S&T program in which some funding for US base rights in Spain is being used to support bilateral cooperative research projects involving both US and Spanish scientists. Indefinite. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE:** 06/01/91
REMARKS: CDC agreement with Fondo de Investigaciones Sanitarias de la Seguridad Social for collaborative research on toxic oil syndrome. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 01/29/64 **TERM DATE:** 01/29/94
REMARKS: Agreement extended in 10-year increments. NASA tracking station in Spain. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 05/01/84 **TERM DATE:** 05/01/89
REMARKS: Would have expired, but was extended indefinitely until new agreement is negotiated. Use of Spanish air bases as Space Shuttle emergency landing sites. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/29/74 **TERM DATE:** 10/04/94
REMARKS: Information exchange and general technical cooperation with CNS. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 11/15/85 **TERM DATE:** 11/15/90
REMARKS: A RES agreement. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 05/01/84 **TERM DATE:** 05/01/88
REMARKS: The US-Spain Agreement of Friendship, Defense and Cooperation under which a Complementary Agreement on Culture and Education and Science and Technology functions, expired May 1988; rights and obligations continue for 1 year. Funds not specified.

SRI LANKA

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 06/01/84 **TERM DATE:** 09/30/89
REMARKS: Training and technical assistance; Mahaweli protected area management; USAID funding of $500,000. Expired and under renegotiation.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 06/01/84 **TERM DATE:** 06/01/90
REMARKS: Agreement on cooperation in S&T. Funding not specified.

SWEDEN

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 09/09/80 **TERM DATE:** 12/31/90
REMARKS: Exchange information in radioactive waste management, particularly in the assessment of rock formations for terminal storage. DOE record No 81. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 07/01/90 **TERM DATE:** 09/01/91
REMARKS: Cooperative research on subsurface problems related to nuclear waste disposal and groundwater contamination. USGS funding: $76,000; Sweden: $57,000.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 10/20/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with Karolinska Institute; quid pro quo interlibrary exchange. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 08/28/73 **TERM DATE:** / /
REMARKS: Agreement for sounding rocket launches from Esrange, Sweden. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/01/84 **TERM DATE:** 12/31/90
REMARKS: Severe accident research, source term, and containment research with SKI/Studsvik. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/03/87 **TERM DATE:** / /
REMARKS: International piping integrity research with SKI/Studsvik. To last the duration of IPRE Program. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/89 **TERM DATE:** 01/31/99
REMARKS: Studsvik Trans-Ramp IV Project. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/06/74 **TERM DATE:** 10/04/94
REMARKS: Information exchange and general technical cooperation with SKI. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/25/85 **TERM DATE:** 02/25/88
REMARKS: Thermal hydraulics. Expired; new agreement under negotiation. Funding not specified.

AGENCY: NSF **SUBJECT:** Basic Sciences
EIF DATE: 10/20/84 **TERM DATE:** 10/20/89
REMARKS: Letter of Agreement for joint research, seminars, workshops and scientific-exchanges with the National Science Research Council of Sweden. Consideration of renewal under process. Funding not specified.

SWITZERLAND

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 04/19/85 **TERM DATE:** 04/19/90
REMARKS: Study of mutually agreed topics associated with the management of radioactive waste and related activities of the nuclear fuel cycle. DOE record No. 158. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 02/21/80 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the Documentation Service of the Swiss Academy of Medical Sciences; quid pro quo interlibrary exchange. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 07/25/89 **TERM DATE:** 12/31/91
REMARKS: Thermal hydraulic research with Paul Scherrer Institute (PSI). Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/09/87 **TERM DATE:** 06/09/91
REMARKS: Severe accident research with FOE; extension under discussion. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/01/87 **TERM DATE:** 07/31/91
REMARKS: International piping integrity research. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: / / **TERM DATE:** / /
REMARKS: Thermal hydraulic transients and ECCS REFLOOD program; extension being negotiated. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/26/86 **TERM DATE:** 09/26/91
REMARKS: Radioactive waste management and safety research with NAGRA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 12/09/74 **TERM DATE:** 09/23/92
REMARKS: Information exchange and general technical cooperation with FOE. Funding not specified.

TAIWAN

GENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** / /
REMARKS: CDC Field Epidemiology Training Program. Termination date: Indefinite. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/12/84 **TERM DATE:** 10/22/90
REMARKS: Participation in Severe Nuclear Accident Research Program with CCNAA/AIT. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 05/01/86 **TERM DATE:** 05/31/90
REMARKS: Thermal hydraulic research between AIT and the CCNAA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 06/26/87 **TERM DATE:** 06/25/90
REMARKS: Plant Analyzer Development between CCNAA and the AIT. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 04/23/87 **TERM DATE:** 07/31/91
REMARKS: Participation in the International Piping Integrity Research Group with CCNAA/AIT. Funding not specified.

THAILAND

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 09/18/85 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

AGENCY: DOD **SUBJECT:** Behavioral Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Thailand and the U.S. Air Force. Concerns research in human performance and stress. Defense Record No. 170. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Natural Resources
EIF DATE: 04/01/84 **TERM DATE:** 04/01/89
REMARKS: Training and technical assistance in national parks; USAID funding of $53,000.

AGENCY: DOI (NPS) **SUBJECT:** Protected Area Management
EIF DATE: 11/08/89 **TERM DATE:** 11/08/92
REMARKS: Technical assistance and training in management, planning, policies, guidelines, resource management, interpretation and infrastructure assessment capabilities under auspices of NPS/USAID PASA. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 04/01/84 **TERM DATE:** 04/01/89
REMARKS: NIH activity under S&T Agreement for aplastic anemia. Funding not specified. Presently being renewed.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/80 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. CDC Field Epidemiology Training Program. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 03/01/90 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. CDC and the Ministry of Health collaboration in HIV-1 and HIV-2 epidemiology, laboratory surveillance and research. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 04/13/84 **TERM DATE:** 10/13/89
REMARKS: Agreement on cooperation in S&T; individual cooperating agencies negotiate funding with counterpart agencies.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 09/19/84 **TERM DATE:** 09/19/89
REMARKS: Agricultural development; human nutrition; soil conservation techniques; post- harvest techniques for tropical fruits and vegetables. Funding not specified.

TURKEY

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 11/01/85 **TERM DATE:** 04/01/90
REMARKS: Agricultural S&T; joint activities FY 1988 included the First World Walnut Conference; few activities planned. Funding not specified.

UNITED ARAB EMIRATES

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/14/88 **TERM DATE:** 02/14/93
REMARKS: Assessment of groundwater resources of Abu Dhabi. Funded by Abu Dhabi Emirate at $6 million. In FY 1990: $1,250,000; 9 resident USGS staff and 0.5 man-years TDYs.

UNITED KINGDOM

AGENCY: DOC (NOAA) **SUBJECT:** Space Technologies
EIF DATE: 02/14/86 **TERM DATE:** 02/14/94
REMARKS: The United Kingdom will provide an Advanced Microwave Sounding Unit (AMSU) for flight on future NOAA spacecraft. Funding not specified.

Appendix I: UNITED KINGDOM

AGENCY: DOD **SUBJECT:** Aeronautics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEA. Involves the United Kingdom and the U.S. Air Force. Concerns wind tunnel testing. Defense Record No. 276. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEA. Involves the United Kingdom and U.S. Department of Defense, especially the Air Force. Concerns advanced organic matrix materials. Defense Record No. 283. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEA. Involves the United Kingdom and U.S. Air Force. Concerns computational mechanics and calculation. Defense Record No. 278. Funding not specified.

AGENCY: DOD **SUBJECT:** Oceanography
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEP. Involves the United Kingdom and U.S. Navy. Concerns oceanographic data and survey equipment. Defense Record No. 631. Funding not specified.

AGENCY: DOD **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEP. Involves the United Kingdom and U.S. Navy. Concerns tribology of marine bearings and seals. Defense Record No. 659. Funding not specified.

AGENCY: DOD **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-IEP. Involves the United Kingdom and U.S. Navy. Concerns software management. Defense Record No. 671. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 03/01/85 **TERM DATE:** 03/01/93
REMARKS: Establish a reciprocal and balanced exchange of decommissioning technology and experiences with nuclear facilities. DOE record No. 155. Funding not specified.

Appendix I: UNITED KINGDOM

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 10/18/84 **TERM DATE:** 04/30/90
REMARKS: IPR currently being renegotiated, will eventually be included. DOE record No. 150. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 09/20/76 **TERM DATE:** 12/31/90
REMARKS: A balanced exchange of liquid metal fast breeder reactor technology in such areas as reactor safety, neutronics analysis, etc., being renegotiated to include Germany, France, Italy and Belgium. DOE record No. 25. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 08/26/88 **TERM DATE:** 08/26/98
REMARKS: Reciprocal, balanced information exchange and collaboration on gas-cooled reactor graphite technology in cooperative areas like graphite creep data; graphite fracture models and data; graphite strength data; and graphite probabilistic risk. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy (Nuclear)
EIF DATE: 10/30/86 **TERM DATE:** 10/30/91
REMARKS: Exchange of technology for management of radioactive waste. DOE record No. 189. Funding not specified.

AGENCY: DOI (NPS) **SUBJECT:** Environment
EIF DATE: 07/21/86 **TERM DATE:** 07/21/91
REMARKS: World Heritage Convention; conservation of protected landscapes, undeveloped coastline, privately owned land; development of trails and voluntary conservation agreement mechanisms; role of public and private sectors in conservation. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/14/84 **TERM DATE:** 09/30/89
REMARKS: Sea floor sonar imagining, surveys using the Geologic Long-Range Inclined Asdic (GLORIA) System. Project funded at $4.5 million. In renewal process for another 5 years effective 09/30/89.

Appendix I: UNITED KINGDOM

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 11/18/89 **TERM DATE:** 11/15/90
REMARKS: Cooperative research on genesis of basalt with University of Manchester. USGS funding: $46,400.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/15/90 **TERM DATE:** 11/30/90
REMARKS: Analysis and modeling of surface water flows. USGS funding: $9,600.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 04/12/90 **TERM DATE:** 09/25/90
REMARKS: Informal scientific cooperation on research on mechanisms of volcanic earthquakes. USGS funding provided by a USGS fellowship. Renewal under consideration.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 05/11/71 **TERM DATE:** / /
REMARKS: Ongoing. Program implemented by the U.S., France, Germany, Italy, Japan, and the United Kingdom. Begun under the auspices of NATO CCMS. Funding not specified.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 03/09/88 **TERM DATE:** / /
REMARKS: Original agreement altered to indefinite duration on 03-09-88; general transport system planning exchanges; civil aviation security. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 06/02/86 **TERM DATE:** / /
REMARKS: Five-year self-renewing agreement for the exchange of information regarding management of hazardous wastes and acid deposition. Coordination of positions on international issues. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/25/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the British Library; quid pro quo interlibrary exchange. Funding not specified.

Appendix I: UNITED KINGDOM

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/30/83 **TERM DATE:** 01/24/92
REMARKS: Severe accident research with AEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 02/12/85 **TERM DATE:** 12/31/91
REMARKS: Nuclear safety research with AEA; modelling of LOCA's. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 01/28/88 **TERM DATE:** 01/28/92
REMARKS: Severe accident research agreement with UKAEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 10/01/88 **TERM DATE:** 09/30/90
REMARKS: Implementing agreement relating to USNRC participation in the UKAEA program. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 07/11/89 **TERM DATE:** 09/30/92
REMARKS: Reliability and probabilistic risk analysis with UKAEA. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 03/13/75 **TERM DATE:** 04/07/91
REMARKS: Information exchange and general technical cooperation with H&SE. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 08/03/77 **TERM DATE:** 08/03/92
REMARKS: General safety research umbrella agreement with AEA. Funding not specified.

USSR

AGENCY: DOC (NIST) **SUBJECT:** Meteorology
EIF DATE: 12/01/78 **TERM DATE:** 12/01/89
REMARKS: Renewal to 12/01/94 negotiated, awaiting final U.S. clearance and signing; renewal contains IPR provisions. Cooperation in thermal physics and thermodynamics, materials science, spectroscopy, chemistry and chemical kinetics, and cryogenic science. Funding not specified.

AGENCY: DOC (NOAA) **SUBJECT:** Marine Science
EIF DATE: 06/01/90 **TERM DATE:** 05/31/95
REMARKS: Oceans Studies Agreement signed by Secretary of State Baker and Foreign Minister Schevardnadze. Funding not specified.

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 06/01/90 **TERM DATE:** 06/01/95
REMARKS: Government-to-government agreement on the peaceful uses of atomic energy, providing for cooperation to be implemented through memoranda of cooperation in magnetic confinement fusion; fast breeder reactor safety; research on the fundamental properties of matter, and civilian reactor safety.

AGENCY: DOT **SUBJECT:** Transportation
EIF DATE: 05/31/88 **TERM DATE:** 05/31/93
REMARKS: Agreement provides for cooperative activities in areas of civil aviation, railroad safety, highway bridge construction and highway and traffic safety programs. The civil aviation program has been extremely active and beneficial to both sides. Funding not specified.

AGENCY: EPA **SUBJECT:** Environment
EIF DATE: 05/23/72 **TERM DATE:** / /
REMARKS: EPA and Goskompriroda are lead agencies for this self-renewing governmental agreement; projects on areas of air and water pollution, park management, nature protection, climate change, earthquake prediction, the Arctic and Subarctic ecosystems, and the environment. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/72 **TERM DATE:** 05/01/92
REMARKS: Under government-to-government health agreement on cancer, cardiovascular disease, environmental health, arthritis, biomedical communication, eye disease and individual health scientist exchange. Funding not specified.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 06/28/74 **TERM DATE:** 06/28/92
REMARKS: Agreement between NHLBI and Ministry of Health, All Union Center for Cardiological Research, for cooperation on artificial heart research and development. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 04/15/87 **TERM DATE:** 04/14/92
REMARKS: Cooperation in 5 areas of space science and applications: Space biology and medicine; solar system exploration; astronomy and astrophysics; solar terrestrial physics; and earth sciences. Funding not specified.

AGENCY: NASA **SUBJECT:** Space
EIF DATE: 07/25/90 **TERM DATE:** / /
REMARKS: A U.S. Total Ozone Mapping Spectrometer (TOMS), including an Interface Adapter Module, will be launched on a Soviet Meteor-3 satellite in August, 1991. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 01/08/89 **TERM DATE:** 01/08/94
REMARKS: Provides for cooperation in basic scientific research in eight areas. Includes two subsidiary memoranda of undertanding. Funding not specified.

AGENCY: USDA **SUBJECT:** Agriculture
EIF DATE: 07/01/73 **TERM DATE:** / /
REMARKS: 9th session of the Joint Committee on Cooperation in Agriculture approved Protocols of agricultural R&D, agricultural economics, food processing & forestry working groups. Agreed to exchange teams of scientists and specialists in 1990 and 1991. Funding not specified.

VENEZUELA

AGENCY: DOE **SUBJECT:** Energy
EIF DATE: 03/06/80 **TERM DATE:** 03/06/93
REMARKS: Agreement to conduct research in energy technologies including petroleum, solar, geothermal, hydroelectric and coal. Eight implementing arrangements in fossil energy.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 02/06/87 **TERM DATE:** 02/06/92
REMARKS: Geologic mapping and mineral resources assessment of the Guyana Shield. Funding provided by Venezuela at $500,000 per year.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 03/01/90 **TERM DATE:** 07/01/91
REMARKS: Pilot project on application of satellite data for scale-true mapping of unmapped areas. USGS funding: $8,000; PAIGH: $6,500.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 07/01/83 **TERM DATE:** 07/01/88
REMARKS: Funding not specified.

AGENCY: USDA **SUBJECT:** Agricultural Science
EIF DATE: 07/01/83 **TERM DATE:** 07/01/88
REMARKS: Funding not specified.

YUGOSLAVIA

AGENCY: DOC (NIST) **SUBJECT:** Basic Sciences
EIF DATE: 06/27/88 **TERM DATE:** 06/26/93
REMARKS: Projects conducted under the umbrella S&T agreement; in FY90 44 active projects with Yugoslav institutions covering a wide range of mutual interests. Funding not specified.

AGENCY: DOI (USGS) **SUBJECT:** Earth Sciences
EIF DATE: 06/27/88 **TERM DATE:** 06/27/93
REMARKS: Projects under the S&T Umbrella Agreement. USGS funding: $6,700, Joint Board: $6,400.

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 11/01/79 **TERM DATE:** 11/01/92
REMARKS: Under US-Yugoslavia S&T Cooperation Agreement, cooperation on: Cardiopulmonary research, metabolic diseases, neurosciences, cancer, human reproduction, alcohol research and individual health, scientist exchanges. Funding not specified.

AGENCY: NRC **SUBJECT:** Nuclear Safety
EIF DATE: 09/19/85 **TERM DATE:** 09/19/90
REMARKS: Information exchange and general technical cooperation with FSEI; Expired, but renewal being renegotiated. Funding not specified.

AGENCY: US Gov **SUBJECT:** S&T Umbrella
EIF DATE: 10/25/88 **TERM DATE:** 10/24/93
REMARKS: Supersedes and terminates the previous umbrella signed on 04-02-80. US participating agencies include: DOE, EPA, HHS, NIST, NSF, USDA, USGS, Bureau of Mines, and others. US contributions: $10 million over 5 years.

ZAIRE

AGENCY: HHS **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Program among CDC, Belgian Ministry of Health, Belgian Institute of Tropical Medicine, the U.S. Armed Forces Institute of Pathology, and NIH to cooperate on AIDS surveillance, research, and prevention. Funding not specified.

Appendix II

Database

Summary of U.S. International S&T Agreements by Agency

Explanation of Database:

The information in the following database is intended to provide an overview of international cooperative activities in science and technology between government agencies of the United States and their counterparts in other countries. Appendix II derives from information on hand in the Department of State and provided it by other Federal agencies and offices. It is as complete as such information permits. In some cases, agreements have technically expired, but are included herein if renewal is pending or if activities under the agreements continue.

For the most part, the items listed in the database are at the Memorandum of Understanding level or higher; however, information for some additional activities was included, based on their scope. In some countries there may be other activities (described in Chapters 2 and 3) outside of agreements described here.

"Country"designates the cooperating foreign nation. "Multilateral" and "regional" are designations assigned to activities conducted with more than one country.

"Entry Into Force" (EIF) and "Termination Date" (Term Date) indicate start and end times of agreements. Agreements renewed with no significant alterations usually retain the original EIF date. Agreements with no termination date have an indefinite term.

Department of Commerce

COUNTRY: France **SUBJECT:** Tech Commercialization
EIF DATE: 02/25/86 **TERM DATE:** 02/25/91
REMARKS: Through Technology Administration. Modeled after Israel BIRD and India PACT agreements. Progressing satisfactorily 27 joint ventures to date. Funding not specified.

Department of Commerce: Census Bureau

COUNTRY: Canada **SUBJECT:** Statistics
EIF DATE: 03/27/86 **TERM DATE:** 03/27/91
REMARKS: MOU recognizes long-standing informal cooperation and provides for its continuation, like exchange visits, joint study and research and, in an important annex, a joint project to reconcile trade statistics like the customs of both nations. Funding not specified.

COUNTRY: China **SUBJECT:** Statistics
EIF DATE: 07/24/84 **TERM DATE:** / /
REMARKS: Low level activity consisting primarily of Chinese delegations to the U.S.; the U.S. taught one workshop in China in 1990, and may provide 6-8 weeks' work-study to 3 Chinese before end of CY90. Discussions have begun on renewal. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Statistics
EIF DATE: 03/27/86 **TERM DATE:** 03/27/91
REMARKS: An important joint training program of Latin America is just beginning. It will be formalized in an annex to the agreement. Activity level: Low end of moderate. This cooperation agreement provides for exchange of methodology, documents, and information. Funding not specified.

Department of Commerce: NIST

COUNTRY: Canada **SUBJECT:** Basic Sciences
EIF DATE: 09/20/88 **TERM DATE:** 09/20/93
REMARKS: Action is in support of NIST statutory mission to collect, evaluate, and publish standard reference scientific data. Agreement states NIST owns database and specifies royalties for use to be paid to NIST. Funding not specified.

COUNTRY: China **SUBJECT**: Metrology
EIF DATE: 01/01/79 **TERM DATE**: 05/01/89
REMARKS: Active while in process of renewal. Sample joint studies are in metrology, standards (including engineering standards), and related applied sciences; temperature, electrical, optical, length, mass, and time measurements and standards. Funding not specified.

COUNTRY: France **SUBJECT**:Engineering
EIF DATE: 12/31/86 **TERM DATE**: 12/31/91
REMARKS: This is the fourth five-year joint program of research in building technology under an understanding signed in 1969 by the Science Advisor to the President. Cooperation in building technology; joint research and exchanges. Funding not specified.

COUNTRY: Hungary **SUBJECT**: Metrology
EIF DATE: 11/22/84 **TERM DATE**: / /
REMARKS: Implementing arrangement under Articles II and III of the Agreement on Cooperation in Culture, Education, Science, and Technology signed April 6, 1977. Provides for short-term exchange of scientists, extended visits in cooperating laboratories. Funding not specified.

COUNTRY: Hungary **SUBJECT**: Meteorology
EIF DATE: 04/01/77 **TERM DATE**: / /
REMARKS: Implementing arrangement under Articles II and III of the Agreement on Cooperation in Culture, Education, Science, and Technology signed April 6, 1977. Provides for short-term exchange of scientists and extended visits in cooperating laboratories. Funding not specified.

COUNTRY: India **SUBJECT**: Basic Sciences
EIF DATE: 10/28/74 **TERM DATE**: / /
REMARKS: Cooperation through US-Indo Joint Commission projects approve after 10/89 will be subject to IPR requirements. Includes projects in materials and physical sciences in cooperation with 20 Indian institutions. Funding not specified.

COUNTRY: Japan **SUBJECT**: Telecommunications
EIF DATE: 09/14/89 **TERM DATE**: 09/13/94
REMARKS: Agreement is with the Nippon Telegraph and Telephone Corporation, a private corporation; joint research on semiconductors, telecommunications, computers and computer networking, time and frequency measurements, and related fields. Funding not specified.

COUNTRY: Korea **SUBJECT**:Metrology
EIF DATE: 06/01/86 **TERM DATE**: 06/01/89
REMARKS: Renewal underway; agreement with Korean Standards Research Institute to improve knowledge and engineering practices in measuring mechanical properties of materials at low temperatures; low pressure measurement techniques. Active. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Materials Science
EIF DATE: 05/01/87 **TERM DATE**: 04/30/92
REMARKS: International accord with France, UK, Italy, Canada, Japan, Germany, and the Commission of European Communities; participation in the Versailles Project on Advanced Materials (VAMAS); NIST represents U.S. in cooperation with pre-standards measurements activities. Funding not specified.

COUNTRY: Poland **SUBJECT**: Basic and Applied Sciences
EIF DATE: 09/29/87 **TERM DATE**: 09/28/92
REMARKS: NIST is one of several U.S. technical agencies cooperating under US-Polish agreement for S&T cooperation. The Maria Sklodowska-Curie Fund is the funding vehicle; 9 active programs in FY90. Funding not specified.

COUNTRY: USSR **SUBJECT**: Metrology
EIF DATE: 12/01/78 **TERM DATE**: 12/01/89
REMARKS: Renewal to 12/01/94 negotiated, awaiting final U.S. clearance and signing; renewal contains IPR provisions. Cooperation in thermal physics,thermodynamics, materials science, spectroscopy, chemistry and chemical kinetics, and cryogenic science. Funding not specified.

COUNTRY: Yugoslavia **SUBJECT**: Basic Sciences
EIF DATE: 06/27/88 **TERM DATE**: 06/26/93
REMARKS: Projects conducted under the umbrella S&T agreement; in FY90 44 active projects with Yugoslav institutions covering a wide range of mutual interests. Funding not specified.

Department of Commerce: NOAA

COUNTRY: Argentina **SUBJECT**: Space Technologies
EIF DATE: 09/24/84 **TERM DATE**: / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through life of Landsat-4 and Landsat-5. Funds not specified.

COUNTRY: Australia **SUBJECT:** Space Technologies
EIF DATE: 03/13/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Brazil **SUBJECT:** Space Technologies
EIF DATE: 05/05/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Canada **SUBJECT:** Atmospheric Science
EIF DATE: 06/28/85 **TERM DATE:** 06/27/90
REMARKS: MOU to improve climate cooperation and coordination; current projects include development of programs to address climate change and impact on the Great Lakes region of North America and on the High Plains region of North America. Funding not specified.

COUNTRY: Canada **SUBJECT:** Space Technologies
EIF DATE: 07/26/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: China **SUBJECT:** Fisheries
EIF DATE: 11/09/85 **TERM DATE:** 07/01/90
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: China **SUBJECT:** Space Technologies
EIF DATE: 07/08/85 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: China **SUBJECT**: Marine Science
EIF DATE: 05/08/79 **TERM DATE**: 05/09/94
REMARKS: Protocol on Cooperation in Field of Marine and Fisheries S&T is framework for: Information exchange, collaborative research(TOGA), and training (scientific training and data management). Other participants: NSF, ONR, academia. China: CAS, Ministry of Agriculture, MAAF. Funding not specified.

COUNTRY: China **SUBJECT**: Atmospheric Science
EIF DATE: 05/08/79 **TERM DATE**: 05/08/94
REMARKS: Protocol on Cooperation in Atmospheric S&T; joint meteorologic studies; training, other participating agencies- NSF, NASA, USDA. Chinese- CAS, National Natural Science Foundation, Ministry of Education, State Meteorological Administration. Funding not specified

COUNTRY: Denmark **SUBJECT**: Fisheries
EIF DATE: 01/01/80 **TERM DATE**: 07/01/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: France **SUBJECT**: Space Technologies
EIF DATE: 03/20/86 **TERM DATE**: / /
REMARKS: France provides onboard data collection system flown on NOAA polar-orbiting satellite; France also provides the data processing system for ARGOS. Funding not specified.

COUNTRY: France **SUBJECT**: Marine Science
EIF DATE: 11/01/69 **TERM DATE**: / /
REMARKS: US-France Cooperation in Oceanography: Joint multidisciplinary oceanographic research; information and data exchanges. Funding not specified.

COUNTRY: Germany **SUBJECT**: Fisheries
EIF DATE: 03/01/77 **TERM DATE**: 08/01/90
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: Iceland **SUBJECT**: Fisheries
EIF DATE: 11/01/84 **TERM DATE**: 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: India **SUBJECT**: Space Technologies
EIF DATE: 10/26/84 **TERM DATE**: / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: India **SUBJECT**: Earth Sciences
EIF DATE: 10/01/74 **TERM DATE**: / /
REMARKS: Six joint research projects in the climate research program were approved under the Indo-US Subcommission on S&T. Funding not specified.

COUNTRY: Israel **SUBJECT**: Marine Science
EIF DATE: 06/05/89 **TERM DATE**: 06/05/94
REMARKS: MOU for marine and freshwater cooperation. Funding not specified.

COUNTRY: Japan **SUBJECT**: Space Technologies
EIF DATE: 08/11/83 **TERM DATE**: / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Japan **SUBJECT**: Fisheries
EIF DATE: 12/18/89 **TERM DATE**: 12/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: Japan **SUBJECT**: Marine Science
EIF DATE: 01/01/64 **TERM DATE**: / /
REMARKS: US-Japan Cooperative Program in Natural Resources: Joint multidisciplinary research projects; information and data exchange. Funding not specified.

COUNTRY: Korea **SUBJECT**: Fisheries
EIF DATE: 03/01/77 **TERM DATE**: 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Fisheries
EIF DATE: 06/24/88 **TERM DATE**: 11/30/89
REMARKS: A MOU for the exchange of scientific and economic data and information on the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Fisheries (Gulf)
EIF DATE: 11/19/86 **TERM DATE**: 11/30/89
REMARKS: A MOU for cooperative research on shared resources in the Gulf of Mexico for the exchange of scientific information and cooperative research in the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Fisheries (Pacific)
EIF DATE: 11/19/86 **TERM DATE**: 11/30/89
REMARKS: A MOU for cooperative research on shared resources in the Pacific and for the exchange of scientific information and cooperative research in the fisheries sector; efforts to renew up to 11/30/94 are underway. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Space Technologies
EIF DATE: 09/01/88 **TERM DATE**: / /
REMARKS: Search and Rescue Satellite System; 15 year agreement including the U.S., USSR, France and Canada. Funding not specified.

COUNTRY: Multilateral (EC) **SUBJECT**: Fisheries
EIF DATE: 06/01/77 **TERM DATE**: 07/31/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: Multilateral (ESA) **SUBJECT**: Space Technologies
EIF DATE: 02/23/84 **TERM DATE**: / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Pakistan **SUBJECT:** Space Technologies
EIF DATE: 11/26/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Poland **SUBJECT:** Fisheries
EIF DATE: 02/01/87 **TERM DATE:** 07/01/91
REMARKS: Governing International Fishery Agreements established on a bilateral basis, conditions under which foreign fishing vessels are granted access to fishery resources within the U.S. Exclusive Economic Zone. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Atmospheric Sciences
EIF DATE: 02/01/75 **TERM DATE:** 08/10/90
REMARKS: Technical Cooperation Agreement, integrating Saudi meteorological services and supporting research programs. Extension to be signed shortly will provide termination in 1995-operating with exchange of letters intent on a 5 years' extension. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Space Technologies
EIF DATE: 09/25/84 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station. It extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: South Africa **SUBJECT:** Space Technologies
EIF DATE: 10/19/83 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station. It extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: Thailand **SUBJECT:** Space Technologies
EIF DATE: 09/18/85 **TERM DATE:** / /
REMARKS: Direct reception and distribution of Landsat data at Landsat ground station; extends through the life of Landsat-4 and Landsat-5. Funding not specified.

COUNTRY: USSR **SUBJECT:** Marine Science
EIF DATE: 06/01/90 **TERM DATE:** 05/31/95
REMARKS: Oceans Studies Agreement signed by Secretary of State Baker and Foreign Minister Schevardnadze. Funding not specified.

COUNTRY: United Kingdom **SUBJECT:** Space Technologies
EIF DATE: 02/14/86 **TERM DATE:** 02/14/94
REMARKS: United Kingdom will provide an Advanced Microwave Sounding Unit (AMSU) for flights on future NOAA spacecraft. Funding not specified.

Department of Defense

COUNTRY: Australia **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement with the U.S. Air Force waiting for Australian signature. It provides real systems with which global distributed processing operating systems can be exercised, evaluated and further developed. Funding not specified.

COUNTRY: Australia **SUBJECT:** Behavioral Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Australia and the U.S. Air Force. Concerns psychological R&D. Defense Record No. 130. Funding not specified.

COUNTRY: Australia **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Australia and the U.S. Navy. Concerns high yield and strength low alloy steels. Defense Record No. 417. Funding not specified.

COUNTRY: Australia **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-PA. Involves Australia and the U.S. Air Force. Concerns fibre composite materials properties. Defense Record No. 137. Funding not specified.

COUNTRY: Australia **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-PA. Involves Australia and the U.S. Air Force. Concerns advanced aircraft materials and structure. Defense Record No. 138. Funding not specified.

COUNTRY: BELIZE **SUBJECT:** Health
EIF DATE: **TERM DATE:**
REMARKS: Uniformed Services of Health Sciences Agreement with the Ministry of Health, Belize City Hospital; epidemiological investigations and medical research in tropical diseases.

COUNTRY: Brazil **SUBJECT**: Meteorology
EIF DATE: / / **TERM DATE**: / /
REMARKS: MOU agreement between the U.S. Air Force and Brazil on weather and ionospheric experiments. DOD Record No. 147. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Meteorology
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Brazil and the U.S. Air Force. Concerns weather data, forecasting, and analysis. Defense Record No. 145. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Meteorology
EIF DATE: / / **TERM DATE**: / /
REMARKS: MOU agreement on weather and ionospheric experiments between Brazil and the U.S. Air Force. Defense Record No. 147. Funding not specified.

AGENCY: DOD (DMA) **SUBJECT**: Space
EIF DATE: 08/02/90 **TERM DATE**: / /
REMARKS: Agreement between the Defense Mapping Agency and the Brazilian Geographic and Statistical Institute (IBGE) for operation of a satellite tracking station to collect geodetic and geophysical data. Funding not specified.

COUNTRY: Canada **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Canada and the U.S. Navy. Concerns software engineering technology. Defense Record No. 452. Funding not specified.

COUNTRY: France **SUBJECT**: Avionics
EIF DATE: / / **TERM DATE**: / /
REMARKS: Unclassified agreement between the U.S. and France as published on June 1990 Combined Annual Report to Congress by DOD on standardization of equipment with NATO members and cooperative R&D projects with Allied countries. Advanced Avionics. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: ADA Programming Support Environment. Unclassified agreement between the U.S. and France listed in June 1990 Combined DOD Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with Allied countries. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: C3 Interoperability (NPIS)-Unclassified project between the U.S. and France listed in 1990 DOD Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with Allied countries. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: POST 2000 TACTICAL AREA COMMUNICATIONS-Unclassified Project between the U.S. and France listed in DOD's June 1990 Combined Annual Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D Projects with Allied countries. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: MIDS-Multi-Functional Information Distribution Systems. Unclassifed project between the U.S. and France listed in 1990 DOD Report to Congress on Standardization of Equipment with NATO Members and Cooperative R&D projects with Allied countries. Funding not specified.

COUNTRY: France **SUBJECT:** Medical Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement - DEA, involving France and the U.S. Air Force. Concerns high enthalpy flow diagnostic and measure. Defense Record No. 222. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns computational fluid dynamic techniques. Defense Record No. 236. Funding not specified.

COUNTRY: France **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns materials/measurements/characterization. Defense Record No. 244. Funding not specified.

COUNTRY: France **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Air Force. Concerns carbon and ceramics material. Defense Record No. 245. Funding not specified.

COUNTRY: France **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France, the U.S. Air Force and Navy. Concerns digital systems architecture and integration. Defense Record No. 524. Funding not specified.

COUNTRY: France **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Army. Concerns integrated circuit components technology. Defense Record No. 848. Funding not specified.

COUNTRY: France **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Army. Concerns dynamic behavior of materials. Defense Record No. 894. Funding not specified.

COUNTRY: France **SUBJECT**: Acoustics
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns acoustics research. Defense Record No. 483. Funding not specified.

COUNTRY: France **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns ceramic and metal matrix composites. Defense Record No. 507. Funding not specified.

COUNTRY: France **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves France and the U.S. Navy. Concerns artificial intelligence. Defense Record No. 508. Funding not specified.

COUNTRY: Germany **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns microelectronics and their applications. Defense Record No. 943. Funding not specified.

COUNTRY: Germany **SUBJECT:** Environment
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns environmental technology. Defense Record No. 945. Funding not specified.

COUNTRY: Germany **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Germany and the U.S. Army. Concerns software technology. Defense Record No. 954. Funding not specified.

COUNTRY: Germany **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-MOU. Involves Germany and the U.S. Air Force. Concerns powder metallurgy of titanium alloys. Defense Record No. 329. Funding not specified.

COUNTRY: India **SUBJECT:** Aeronautics
EIF DATE: 09/01/88 **TERM DATE:** / /
REMARKS: Termination date in 2 yrs (extended 1 yr. at a time). This concerns U.S. Air Force consultancy and training related to US-India Aeronautical Cooperation Program. Services provided by LOA defined by technology transfer guidelines approved by USG. Funding: $1,600,000. Active foreign military sales case.

COUNTRY: India **SUBJECT:** Natural Resources
EIF DATE: 05/04/84 **TERM DATE:** 03/31/91
REMARKS: To investigate marine flora and fauna from Indian Ocean region as sources for eventual chemicals and drugs. Only existing marine science field research program between the U.S. and India. Technical supervisory committee meets annually. Funding: 28,606,120 Rupees.

COUNTRY: India **SUBJECT:** Natural Resources
EIF DATE: 03/05/90 **TERM DATE:** 03/04/93
REMARKS: Determination of environmental, biological and biochemical parameters that control macrofouling of surfaces in the Indian waters. Emphasis on prevention and control of biodeterioration. Approved by Government of India. Funded by ONR: 1,982,000 Rupees.

COUNTRY: India **SUBJECT:** Natural Resources
EIF DATE: 04/20/90 **TERM DATE:** 04/19/93
REMARKS: To extract and study the antifouling properties of selected bioactive compounds from marine organisms of the Indian Ocean. Project approved by Government of India/Department of Economic Affairs and funded by ONR: 1,986,000 Rupees.

COUNTRY: India **SUBJECT:** Natural Resources
EIF DATE: 04/20/90 **TERM DATE:** 04/19/93
REMARKS: Neuroendocrine regulation of the larval development in marine-fouling crustacea. Project approved by the Government of India/Dept of Economic Affairs and funded by ONR - 1,971,000 Rupees.

COUNTRY: India **SUBJECT:** Medical Research
EIF DATE: 02/09/90 **TERM DATE:** 02/08/91
REMARKS: Evaluation of new antimalarial drugs for prophylactic activity in primate models. This project, sponsored by Walter Reed Army Institute of Research, tests 10 drugs at Central Drug Research Institute in Lucknow. Contract and payment (1,626,000 Rupees) to CDRI.

COUNTRY: India **SUBJECT**: Medical Research
EIF DATE: 10/26/82 **TERM DATE**: 10/31/91
REMARKS: Development of new anti-malarial drugs to combat drug-resistant P.Falciparum infections and to prevent relapse of P. Vivax malaria. Extensions held in abeyance on IPR matter. Work continued with CDRI's own funds and 12,939,108 rupees from U.S. contract.

COUNTRY: India **SUBJECT**: Materials Research
EIF DATE: 09/22/86 **TERM DATE**: 09/30/91
REMARKS: Project studies properties of quasicrystals to design new alloy systems of unique properties and almost zero corrosion rate for iron-based metallic glasses. Funded: 3,308,300 RS. 2-yr extension with funds 1,400,000 Rupees, approved by DEA(6/90) and NIST cleared.

COUNTRY: India **SUBJECT**: Materials Research
EIF DATE: 09/22/86 **TERM DATE**: 09/30/91
REMARKS: A Study on 3 aspects of corrosion in order to better understand passivation of surfaces on a molecular basis. Funding: 2,413,500 Rupees, extended with funds of 885,400 Rupees approved by DEA in June 1990; NIST also cleared extra funds.

COUNTRY: India **SUBJECT**: Materials Research
EIF DATE: 06/11/86 **TERM DATE**: 09/30/91
REMARKS: Study of wear-resistant tribological coatings in order to establish a link between sputter-deposition parameters for coating deposition and ultimate tribological performance. Funding: 2,570,000 Rupees,(with 956,00 RS. more in 6/90 by DEA). NIST also cleared.

COUNTRY: India **SUBJECT**: Materials Research
EIF DATE: 04/14/89 **TERM DATE**: 04/13/92
REMARKS: To develop an extra low-carbon steel with high toughness, low impact transition temperature and with good formability and weldability. Funding: 1,500,000 Rupees.

COUNTRY: India **SUBJECT:** Materials Research
EIF DATE: 05/30/89 **TERM DATE:** 05/30/92
REMARKS: To develop a high resolution scanning tunneling microscope capable of operation in air and high vacuum. Project approved by U.S. and India. Funding: 11,100,000 Rupees; first payment released in May 1990.

COUNTRY: India **SUBJECT:** Materials Research
EIF DATE: 12/31/86 **TERM DATE:** 09/30/91
REMARKS: To study fracture and fatigue properties of advanced engineering ceramics for making them with desired microstructural and mechanical properties. Funding: 1,777,600 Rupees. 2-yrs. extension approved by DEA and cleared by NIST; 70,000 Rupees more allocated.

COUNTRY: India **SUBJECT:** Materials Research
EIF DATE: 09/22/86 **TERM DATE:** 09/30/91
REMARKS: Study variety of naval engineering materials to establish the process of corrosion and stress corrosion, so remedial measures can be suggested. Funding: 3,165,200 Rupees. 2-yrs. extension approved by DEA, with 917,000 Rupees more funded. NIST also approved.

COUNTRY: India **SUBJECT:** Medical Research
EIF DATE: 09/01/84 **TERM DATE:** 08/31/91
REMARKS: Evaluation of interferon and interferon inducers in control of parasitic infections. Funding: 1,655,900 Rupees. Indo-US conference held in Lucknow in Sept., 1986. Emphasis on affect on malaria, leishmaniasis, filariasis, amebic meningoencephalitis.

COUNTRY: India **SUBJECT:** Medical Research
EIF DATE: 09/14/84 **TERM DATE:** 08/31/91
REMARKS: To investigate the causes of and possible therapy for oral and cervical carcinomas---studying roles of herpes simplex virus types I and II. Funding: 951,400 Rupees.

COUNTRY: Israel **SUBJECT:** Materials Research
EIF DATE: 12/14/87 **TERM DATE:** 12/13/97
REMARKS: MOU between Israel and the U.S. concerning the principles governing mutual cooperation in R&D, scientist and engineer exchange, and procurement and logistic support of defense equipment. Funding not specified.

COUNTRY: Israel **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Israel and the U.S. Navy. Concerns applied oceanography. Defense Record No. 537. Funding not specified.

COUNTRY: Israel **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Israel and the U.S. Navy. Concerns applied oceanography. Defense Record No. 541. Funding not specified.

COUNTRY: Italy **SUBJECT**: Materials Research
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Italy and the U.S. Air Force. Concerns nondestructive evaluation (NDE) of composites. Defense Record No. 162. Funding not specified.

COUNTRY: Japan **SUBJECT**: Technology Transfer
EIF DATE: 03/08/54 **TERM DATE**: / /
REMARKS: Mutual defense assistance agreement is basis for activities of U.S. Embassy's mutual defense assistance office and for later agreements for the transfer of technology. Renewable every 10 yrs automatically, unless either party declines. Funding not specified

COUNTRY: Japan **SUBJECT**: Technology Transfer
EIF DATE: 01/01/85 **TERM DATE**: / /
REMARKS: 3 Agreements allowed Japanese military technology to be transferred to the U.S.--2 were shipbuilding-related technologies, 1 dealt with the Keiko-SAM missile (not transferred due to restrictions with Toshiba), 1 dealt with FSX technology. Funding not specified.

COUNTRY: Korea **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves South Korea and the U.S. Army. Concerns material technology. Defense Record No. 1022. Funding not specified.

COUNTRY: Korea **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves South Korea and the U.S. Navy. Concerns oceanography. Defense Record No. 579. Funding not specified.

COUNTRY: Mozambique **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Mozambique and the U.S. Navy. Concerns oceanographic acoustic research. Defense Record No. 1189. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEP. Involves Canada, United Kingdom, Australia, and the U.S. Navy. Concerns non-metallic materials/corrosion control. Defense Record No. 431. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Chemistry
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns modeling and analytical chemistry defense system. Defense Record No. 369. Funding not specific.

COUNTRY: Multilateral **SUBJECT**: Aeronautics
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, Australia, New Zealand, United Kingdom, and the U.S. Concerns maneuvering aerodynamics. Defense Record No. 717. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns metals. Defense Record No. 744. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns ceramics. Defense Record No. 745. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns organic materials. Defense Record No. 746. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns materials performance. Funding not specified. Defense Record No. 747.

COUNTRY: Multilateral **SUBJECT:** Materials Research
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, Australia, New Zealand, United Kingdom, and the U.S. Concerns nondestructive testing. Defense Record No. 748. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns electronic materials. Defense Record No. 749. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Aeronautics
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns aeronautics. Defense Record No. 714. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns materials. Defense Record No. 743. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns communications technology and information system. Defense Record No. 765. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Behavioral Sciences
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns behavioral sciences. Defense Record No. 769. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns computing technology. Defense Record No. 82. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns communication network architecture. Defense Record No. 766. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Space
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns space communications. Defense Record No. 767. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns machine intelligence. Defense Record No. 786. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns digital logic design. Defense Record No. 787. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns trusted computer system. Defense Record No. 783. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns software engineering. Defense Record No. 784. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Computer Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-TTCP. Involves Canada, New Zealand, Australia, United Kingdom, and the U.S. Concerns machine and system architecture. Defense Record No. 785. Funding not specified.

COUNTRY: Multilateral (NATO) **SUBJECT:** Avionics
EIF DATE: 09/24/88 **TERM DATE:** / /
REMARKS: Agreement with Germany, France, and the United Kingdom. Encompasses 3 bilateral projects. Development of 32- and 16-bit processing modules, high speed data business modules, a video processing module and system couplers. MOU with France signed; the ones with the United Kingdom and Germany are under review. Funding not specified.

COUNTRY: Multilateral (NATO) **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-AGARD, involving NATO and DOD. Concerns structures and materials panel. Defense Record No. 388. Funding not specified.

COUNTRY: Norway **SUBJECT:** Energy
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Norway, the U.S. Army and Navy. Concerns energy conversion. Defense Record No. 616. Funding not specified.

COUNTRY: Spain **SUBJECT:** Technical Cooperation
EIF DATE: 06/09/80 **TERM DATE:** / /
REMARKS: Provides for exchange of technical information related to development of weapons systems of mutual interest to the U.S. and Spain. Six annexes (fluids and lubricants, solid propellant, antenna design, mines, shipboard gun systems, proving grounds). Funding not specified.

COUNTRY: Spain **SUBJECT:** Materials Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agreement-DEA. Involves Spain and the U.S. Air Force. Concerns fluids and lubricants technology. Funding not specified.

COUNTRY: Spain **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Spain and the U.S. Navy. Concerns oceanography and hydrography. Defense Record No. 623. Funding not specified.

COUNTRY: Thailand **SUBJECT**: Behavioral Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-DEA. Involves Thailand and the U.S. Air Force. Concerns research in human performance and stress. Defense Record No. 170. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Aeronautics
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEA. Involves United Kingdom and the U.S. Air Force. Concerns wind tunnel testing. Defense Record No. 276. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEA. Involves United Kingdom and the U.S. Department of Defense, especially the Air Force. Concerns advanced organic matrix materials. Defense Record No. 283. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEA. Involves the United Kingdom and U.S. Air Force. Concerns computational mechanics and calculation. Defense Record No. 278. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Oceanography
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEP. Involves United Kingdom and the U.S. Navy. Concerns oceanographic data and survey equipment. Defense Record No. 631. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Materials Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEP. Involves United Kingdom and the U.S. Navy. Concerns tribology of marine bearings and seals. Defense Record No. 659. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Computer Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Agreement-IEP. Involves United Kingdom and the U.S. Navy. Concerns software management. Defense Record No. 671. Funding not specified.

Department of Defense: Corps of Engineers

COUNTRY: China **SUBJECT**: Water Resources
EIF DATE: 04/09/86 **TERM DATE**: 04/04/91
REMARKS: Protocol under the umbrella S&T agreement on water resources and related subjects; agreement between the Department of Army and Ministry of Water Resources and Electric Power; annexes for specific studies involving the Corps of Engineers currently. Funding not specified.

COUNTRY: USSR **SUBJECT**: Building Technology
EIF DATE: 06/01/84 **TERM DATE**: / /
REMARKS: Participation under the direction of DOD in the US-USSR Joint Committee on Cooperation in the Field of Housing and Other Construction; implementing project agreements now being negotiated. Not actually an independent agreement. Funding not specified.

Department of Energy

COUNTRY: Australia **SUBJECT**: Energy
EIF DATE: 04/11/88 **TERM DATE**: 04/11/98
REMARKS: Establishing wider cooperation in the areas of research and development. DOE record No. 238. Funding not specified.

COUNTRY: Belgium **SUBJECT**: Energy (Nuclear)
EIF DATE: 01/19/81 **TERM DATE**: 01/19/94
REMARKS: Establish an exchange of technology in the field of radioactive waste management to include terminal storage in geological formations; technology of retrievable storage; waste processing technology and environmental effects. Funding not specified.

COUNTRY: Canada **SUBJECT**: Energy (Fossil)
EIF DATE: 06/04/79 **TERM DATE**: 12/04/94
REMARKS: Establish a framework for cooperation with R&D activities in tar sands and heavy oil extraction processing and related technologies. DOE record No. 46. Being extended through 12/04/94. Funding not specified.

COUNTRY: Canada **SUBJECT**: Energy (Nuclear)
EIF DATE: 08/25/82 **TERM DATE**: 08/29/92
REMARKS: Study of topics associated with management of radioactive waste and related activities of the nuclear cycle, i.e., preparation and packaging, decontamination and decommissioning; surface and subsurface storage, etc. DOE record No. 107. Funding not specified.

COUNTRY: Canada **SUBJECT**: Energy (Fusion)
EIF DATE: 11/19/87 **TERM DATE**: 11/19/92
REMARKS: Finding solutions to mutually agreed upon problems associated with the development of magnetic fusion as a source of energy. DOE record No. 227. Funding not specified.

COUNTRY: Canada **SUBJECT**: Energy
EIF DATE: 12/04/86 **TERM DATE**: 12/04/96
REMARKS: Establishing wider cooperation in the areas of research and development. DOE record No. 194. Funding not specified.

COUNTRY: China **SUBJECT**: Energy (Fossil)
EIF DATE: 04/16/85 **TERM DATE**: 04/16/90
REMARKS: Cooperation in fossil energy R&D with emphasis on atmospheric and pressurized fluid bed combustion; surface coal gasification; coal liquefaction and enhanced oil recovery, other participating agencies- NASA, NOAA, NCAR. Funding not specified.

COUNTRY: EC **SUBJECT**: Energy (Nuclear)
EIF DATE: 10/06/82 **TERM DATE**: 10/06/92
REMARKS: Exchange of information on the management of radioactive waste, i.e., characterization of waste forms and disposal in geologic formations. DOE record No. 110. Funding not specified.

COUNTRY: EC **SUBJECT**: Energy (Fusion)
EIF DATE: 12/15/86 **TERM DATE**: 12/15/96
REMARKS: Maintain and intesify cooperation between EURATOM and DOE in areas covered by their respective magnetic fusion programs to develop scientific and technological understanding underlying a magnetic fusion power system. DOE record No. 195. Funding not specified.

COUNTRY: EC **SUBJECT**: Energy (Nuclear)
EIF DATE: 07/07/86 **TERM DATE**: 07/07/91
REMARKS: Cooperation on a range of R&D aspects of radiation protection in areas such as: Source and dose determination; environmental processes and effects; somatic health effects; genetic health effects, etc. DOE record No. 185. Funding not specified.

COUNTRY: EC **SUBJECT**: Energy (Nuclear)
EIF DATE: 01/28/82 **TERM DATE**: 06/30/90
REMARKS: Nuclear material safeguards research and development. DOE record No. 97. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 05/31/85 **TERM DATE**: 05/31/90
REMARKS: Cooperate on research, development, test, and evaluation of technology and procedures to improve national nuclear material accounting and control measures. DOE record No. 160. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 04/22/83 **TERM DATE**: 04/22/93
REMARKS: Cooperation on research, development, test and evaluation to improve physical protection of nuclear materials and facilities. DOE record No. 122. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 12/19/88 **TERM DATE**: 12/19/90
REMARKS: Establish and cover a program of scientific cooperation to engage in and be specifically limited to the unclassified utilization of high power lasers in laser-matter interaction physics, diagnostics, and associated technical developments. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 09/13/85 **TERM DATE**: 09/13/90
REMARKS: Establish a basis for cooperation in the field of remote systems technology, i.e., applications feasability; remote work efficiency; optimization and refinement. DOE record No. 165. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 01/18/77 **TERM DATE**: 12/31/90
REMARKS: Establish for mutual benefit a balanced exchange of LMFBR technology, i.e., safety to include experimental out-of-pile and in-pile research and theoretical analyses; and physics including nuclear data, calculation methods, etc. DOE record No. 26. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Fossil)
EIF DATE: 02/16/88 **TERM DATE**: 02/16/91
REMARKS: Establish a balanced exchange of energy information on enhanced oil recovery techniques. DOE record No. 233. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 07/26/83 **TERM DATE**: 07/26/93
REMARKS: Cooperation in all phases of radioactive waste management. DOE record No. 127. Funding not specified.

COUNTRY: France **SUBJECT**: Energy (Nuclear)
EIF DATE: 06/20/86 **TERM DATE**: 06/20/91
REMARKS: Exchange and sharing of nuclear criticality data. DOE record No. 184. Funding not specified.

COUNTRY: Germany **SUBJECT**: Energy (Nuclear)
EIF DATE: 12/20/74 **TERM DATE**: 12/31/89
REMARKS: Cooperation in radioactive waste management regarding the disposal of separated waste products and disposal of spent fuel. DOE record No. 18. To be extended 5 years. Funding not specified.

COUNTRY: Germany **SUBJECT**: Energy (Nuclear)
EIF DATE: 02/11/77 **TERM DATE**: 02/11/92
REMARKS: Development of gas-cooled reactors: Possible use as high temperature gas-cooled reactors for steam cycle, direct cycle or process heat, or as gas-cooled fast breeder reactors. DOE record No. 27. Funding not specified.

COUNTRY: Germany **SUBJECT**: Energy (Nuclear)
EIF DATE: 06/08/76 **TERM DATE**: 12/31/90
REMARKS: Finding solutions to problems connected with design, development, construction, and operation of nuclear power systems utilizing LMFBRs and to exchange information developed during the resolution of these problems. DOE record No. 23. Funding not specified.

COUNTRY: Germany **SUBJECT:** Energy
EIF DATE: 04/24/87 **TERM DATE:** 04/24/92
REMARKS: Establish basis for cooperation in field of remote systems technology in areas such as remote connector evaluations, low-flow ventilation system (off-gas technology), robotic process samples and advanced semimanipulator hardware. DOE record No. 200. Funding not specified.

COUNTRY: India **SUBJECT:** Energy (Fossil)
EIF DATE: 08/31/87 **TERM DATE:** 08/31/92
REMARKS: Cooperation on R&D activities pertaining to enhanced oil recovery, underground coal gasification and related technologies. DOE record No. 214. Funding not specified.

COUNTRY: Israel **SUBJECT:** Energy (Physics)
EIF DATE: 05/27/87 **TERM DATE:** 05/27/92
REMARKS: Cooperation in high energy physics, applied mathematical sciences, and other basic energy sciences. DOE record No. 205. Funding not specified.

COUNTRY: Israel **SUBJECT:** Energy
EIF DATE: 06/03/84 **TERM DATE:** 06/03/90
REMARKS: General bilateral agreement for the purpose of establishing wider cooperation in the field of energy research and development. DOE record No. 144. Funding not specified.

COUNTRY: Italy **SUBJECT:** Energy
EIF DATE: 12/05/85 **TERM DATE:** 12/05/90
REMARKS: Bilateral agreement for purpose of establishing wider cooperation in field of energy R&D. This MOU replaces the MOU between the same parties which expired in 1979. A separate MOU for information exchange was signed. Funding not specified.

COUNTRY: Italy **SUBJECT:** Energy (Renewable)
EIF DATE: 06/03/75 **TERM DATE:** 06/03/90
REMARKS: Collaboration in geothermal R&D to include hot dry rock, brine utilization and deep drilling methods. DOE record No. 19. Funding not specified.

COUNTRY: Japan **SUBJECT:** Energy (Nuclear)
EIF DATE: 01/31/79 **TERM DATE:** 01/31/90
REMARKS: Cooperation in the design, development, construction and operation of liquid metal fast breeder reactors. DOE record No. 39. Funding not specified.

COUNTRY: Japan **SUBJECT**: Energy (Nuclear)
EIF DATE: 12/03/86 **TERM DATE**: 12/03/96
REMARKS: Study topics and develop cooperatively and jointly technology and techniques necessary for the safe management of radioactive wastes. DOE record No. 193. Funding not specified.

COUNTRY: Japan **SUBJECT**: Energy
EIF DATE: / / **TERM DATE**: / /
REMARKS: By Memoranda and Contracts cooperation ranges from studying responses to radiation at the Radiation Effects Research Foundation at Hiroshima and Nagasaki, to high energy physics and fusion research. Also, clean coal tech, solar energy. Funding not specified.

COUNTRY: Japan **SUBJECT**: Energy
EIF DATE: 07/01/89 **TERM DATE**: 07/01/94
REMARKS: Contract with Central Research Institute of the Electric Power Industry of Japan to facilitate CRIEPI's participation in DOE's ongoing pyroprocessing development efforts of its integral fast reactor program. Funding not specified.

COUNTRY: Korea **SUBJECT**: Energy
EIF DATE: 11/06/11 **TERM DATE**: 11/06/91
REMARKS: Cooperation in the broad area of energy conservation. DOE record No. 94. Funding not specified.

COUNTRY: Korea **SUBJECT**: Energy (Fossil)
EIF DATE: 11/06/81 **TERM DATE**: 10/08/91
REMARKS: Exchange of coal-related information; personnel exchange and consultation in coal technology. DOE record No. 96. Funding not specified.

COUNTRY: Korea **SUBJECT**: Energy (Renewable)
EIF DATE: 11/06/81 **TERM DATE**: 11/06/91
REMARKS: Cooperation in all phases of solar energy research. DOE record No. 95. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Energy (Fossil)
EIF DATE: 06/20/83 **TERM DATE**: 06/20/90
REMARKS: Exchange information and develop basic and applied research programs in petroleum technology. DOE record No. 125. Funding not specified.

AGENCY: DOE **SUBJECT:** Environment
EIF DATE: 07/19/90 **TERM DATE:** 07/19/94
REMARKS: Agreement of Los Alamos National Lab and the Mexican Petroleum Institute to exchange technical information and cooperate in the analysis of aire qulity and alternative energy strategies for improving air quality in the Mexico City Basin. U.S. contribution up to $4.5 million; Mexican funding $4.5 million.

COUNTRY: Mexico **SUBJECT:** Energy (Renewable)
EIF DATE: 04/07/86 **TERM DATE:** 04/07/94
REMARKS: Develop an understanding of geothermal reservoirs in sedimentary and fractured igneous rocks. DOE record No. 178. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Energy
EIF DATE: 02/01/90 **TERM DATE:** 02/01/95
REMARKS: Bilateral umbrella energy research agreement was renewed for 5 years. Discussions continued through 1990 to develop arrangements for the transport to Japan of the plutonium recovered from reprocessing in the United Kingdom and France. Funding not specified.

COUNTRY: Norway **SUBJECT:** Energy (Fossil)
EIF DATE: 04/22/87 **TERM DATE:** 04/22/92
REMARKS: Establish an exchange of scientific and technical information regarding fossil energy R&D and conduct joint basic and/or applied fossil energy research projects. DOE record No. 199. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Energy (Renewable)
EIF DATE: 02/04/87 **TERM DATE:** 02/04/92
REMARKS: Finding solutions to mutually agreed on problems in renewable energy research and development. DOE record No. 197. Funding not specified.

COUNTRY: Spain **SUBJECT:** Energy
EIF DATE: 06/06/86 **TERM DATE:** 06/06/91
REMARKS: Cooperation in R&D pertaining to nuclear waste management; renewable energy, including biomass, coal and gas technologies, conservation, high energy physics, and environmental impact of energy technology. DOE record No. 181. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Energy (Nuclear)
EIF DATE: 09/09/80 **TERM DATE**: 12/31/90
REMARKS: Exchange information in radioactive waste management, particularly in the assessment of rock formations for terminal storage. DOE record No. 81. Funding not specified.

COUNTRY: Switzerland **SUBJECT**: Energy (Nuclear)
EIF DATE: 04/19/85 **TERM DATE**: 04/19/90
REMARKS: A study of mutually agreed upon topics associated with the management of radioactive waste and related activities of the nuclear fuel cycle. DOE record No. 158. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Energy (Nuclear)
EIF DATE: 03/01/85 **TERM DATE**: 03/01/93
REMARKS: Establish a reciprocal and balanced exchange of decommissioning technology and experiences with nuclear facilities. DOE record No. 155. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Energy
EIF DATE: 10/18/84 **TERM DATE**: 04/30/90
REMARKS: IPR currently being renegotiated; will eventually be included. DOE record No. 150. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Energy (Nuclear)
EIF DATE: 09/20/76 **TERM DATE**: 12/31/90
REMARKS: A balanced exchange of liquid metal fast breeder reactor technology in such areas as reactor safety, neutronics analysis, etc., being renegotiated to include Germany, France, Italy and Belgium. DOE record No. 25. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Energy (Nuclear)
EIF DATE: 08/26/88 **TERM DATE**: 08/26/98
REMARKS: Reciprocal, balanced information exchange and collaboration on gas-cooled reactor graphite technology in cooperative areas like graphite creep data; graphite fracture models and data; graphite strength data; and graphite probabilistic risk. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Energy (Nuclear)
EIF DATE: 10/30/86 **TERM DATE**: 10/30/91
REMARKS: Exchange of technology for management of radioactive waste. DOE record No. 189. Funding not specified.

COUNTRY: Venezuala **SUBJECT:** Energy
EIF DATE: 03/06/80 **TERM DATE:** 03/06/93
REMARKS: Agreement to conduct research in energy technologies including petroleum, solar, geothermal, hydroelectric and coal. Eight implementing arrangements in fossil energy.

Department of Health and Human Services

COUNTRY: Australia **SUBJECT:** Biomedical Sciences
EIF DATE: 08/01/76 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. NIH National Library of Medicine MEDLARS Agreement with the National Library of Australia. Quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Austria **SUBJECT:** Biomedical Sciences
EIF DATE: 04/14/87 **TERM DATE:** 04/14/92
REMARKS: Agreement between NIH and the Austrian Science Foundation for the support of biomedical scientist exchanges. Funding not specified.

COUNTRY: Brazil **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/77 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. NIH/National Library of Medicine MEDLARS Agreement with Centro Latino-Americano de Informaciao em Cienceas de Salude (BIREME); quid pro quo interlibrary exchanges. Funding not specified.

COUNTRY: Bulgaria **SUBJECT:** Biomedical Sciences
EIF DATE: 05/18/90 **TERM DATE:** 05/18/93
REMARKS: Original agreement (11/04/86) was renewed in 1990 for 3 years. Agreement between NIH and the Bulgarian Medical Academy for support of biomedical scientist exchanges under the umbrella US-Bulgaria Exchanges Agreement. Funding not specified.

COUNTRY: Canada **SUBJECT:** Biomedical Sciences
EIF DATE: 07/30/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. NIH/National Library of Medicine. MEDLARS Agreement with Canada Institute for Scientific & Technical Information (CISTI); quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Canada **SUBJECT**: Health Statistics
EIF DATE: 01/01/87 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. Cooperation between the CDC National Center for Health Statistics and Vital Statistics Council for Canada; Statistics Canada Advisory Commission on health statistics. Funding not specified.

COUNTRY: China **SUBJECT**: Biomedical Sciences
EIF DATE: 06/22/79 **TERM DATE**: 06/22/93
REMARKS: Cooperation under Health Protocol with Chinese Academy of Medical Sciences; cancer; cardiovascular diseases; infectious diseases; environmental health; human genetics; reproductive physiology; immunology; biomedical information science; food and drugs. Funding not specified.

COUNTRY: China **SUBJECT**: Biomedical Sciences
EIF DATE: 08/01/87 **TERM DATE**: 08/01/92
REMARKS: MOU Agreement between the National Eye Institute, NIH, and the Zhongshan Ophthalmic Center, Chinese Academic Medical Sciences for joint vision research projects, exchange scientist programs, and cooperation in clinical trials. Funding not specified.

COUNTRY: China **SUBJECT**: Biomedical Sciences
EIF DATE: 06/28/83 **TERM DATE**: 06/28/92
REMARKS: Original agreement renewed in 1989. Agreement between National Institute of Neurological and Communicative Disorders and Stroke, NIH, and the Shanghai Brain Research Institute, Academy of Sciences. Funding not specified.

COUNTRY: China **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/89 **TERM DATE**: 01/01/93
REMARKS: MOU Agreement between CDC and the Chinese Academy of Preventive Medicine to establish a "sister institution" relationship. Funding not specified.

COUNTRY: Colombia **SUBJECT**: Biomedical Sciences
EIF DATE: 03/12/81 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the Pan American Federation of Associations of Medical Schools; quid pro quo interlibrary exchanges. Funding not specified.

COUNTRY: Cote D'Ivoire **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/87 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Centers for Disease Control and the Ministry of Health collaboration in HIV-1 and HIV-2 epidemiology, laboratory surveillance and research. Funding not specified.

COUNTRY: Egypt **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE:** 11/01/91
REMARKS: USAID-funded NIH program under the Congressionally mandated Middle East Regional Cooperative Program established following the Camp David Accord; epidemiologic and immunologic studies on vector-borne diseases. Funding not specified.

COUNTRY: Egypt **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/84 **TERM DATE:** 05/01/91
REMARKS: US-Egypt agreement on health cooperation to develop projects on environmental health, respiratory infections, eye diseases, congenital anomalies, lymphoma/leukemia research, biomedical instrumentation, drugs, biologics, health statistics. Funding not specfd.

COUNTRY: Finland **SUBJECT:** Biomedical Sciences
EIF DATE: 10/29/82 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. MOU between PHS/CDC and the Ministry of Social Affairs and Health of Finland on occupational safety and health, food and drugs, alcohol abuse, and health services, vaccine development, biomedical research and exchange of information. Funding not specified.

COUNTRY: France **SUBJECT:** Biomedical Sciences
EIF DATE: 10/26/84 **TERM DATE:** 10/26/89
REMARKS: Agreement being renewed. NIH and the French Institute of Health and Medical Research- cancer, cardiovascular, pulmonary, immunology and infectious diseases, instrumentation, biomedical; engineering and neuro-sciences, instrumentation; technical assessment, and AIDS. Funding not specified.

COUNTRY: France **SUBJECT:** Biomedical Sciences
EIF DATE: 12/20/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the French Institute of Health and Medical Research; quid pro quo interlibrary exchanges. Funding not specified.

COUNTRY: Germany **SUBJECT:** Biomedical Sciences
EIF DATE: 10/08/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the German Institute of Medical Documentation and Information; quid pro quo interlibrary exchanges. Funding not specified.

COUNTRY: Germany **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/76 **TERM DATE:** 09/01/91
REMARKS: Agreement with the Ministry of Research and Technology in cardiovascular, pulmonary, and blood diseases, cancer arthritis and AIDS research. Funding not specified.

COUNTRY: Guatemala **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/79 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Ministry of Health, Universidad del Valle, and the U.S. Centers for Disease Control collaborate in vector-borne parasitic disease research and training. Funding not specified.

COUNTRY: Hungary **SUBJECT:** Biomedical Sciences
EIF DATE: 04/01/77 **TERM DATE:** / /
REMARKS: NIH projects under the US-Hungary S&T Agreement on Cooperation in Culture, Education, Science and Technology; cardiovascular, pulmonary, and blood diseases; individual health sciences exchanges. Funding not specified.

COUNTRY: Hungary **SUBJECT:** Biomedical Sciences
EIF DATE: 02/23/81 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Agreement between the National Cancer Institute and the Hungarian National Institute of Oncology for cancer research. Funding not specified.

COUNTRY: Hungary **SUBJECT:** Biomedical Sciences
EIF DATE: 10/04/89 **TERM DATE:** 10/04/94
REMARKS: US-Hungary S&T cooperation in medical sciences and health; joint research projects; joint scientific workshops; exchange of science and technology information. Renewable in ten years. Funding not specified.

COUNTRY: India **SUBJECT**: Biomedical Sciences
EIF DATE: 09/09/86 **TERM DATE**: 09/09/91
REMARKS: MOU formalized long-standing relationship between NIH laboratories and selected Indian Council for Scientific and Industrial Research laboratories, basic research in cellular molecular biology and biophysics. Funding not specified.

COUNTRY: India **SUBJECT**: Biomedical Sciences
EIF DATE: 06/01/87 **TERM DATE**: 06/01/92
REMARKS: Vaccine and immunodiagnostics development; vaccine quality control; immunization programs development; Vaccine Action Program is joint effort by PHS & USAID; Nodal Indian Agency is Department of Biotechnology with MOHFW & Council of Medical Research. Funding not specified.

COUNTRY: India **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE**: 12/31/91
REMARKS: Projects under the Reagan-Gandhi S&T initiative; NIH conducts projects in immunology and reproduction, blindness prevention, leprosy, filariasis, tuberculosis, malaria. Funding not specified.

COUNTRY: India **SUBJECT**: Biomedical Sciences
EIF DATE: 11/01/83 **TERM DATE**: 02/08/91
REMARKS: MOU for cooperation between ADAMHA and the Indian National Institute of Mental Health and Neuro Sciences (NIMHANS); projects in alcoholism, drug abuse, and mental health. Funding not specified.

COUNTRY: India **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/62 **TERM DATE**: / /
REMARKS: Indo-US Subcommission on S&T; on infectious diseases, blindness prevention, reproductive physiology, molecular biology, pharmacology, child health and development, mental health, substance abuse, longitudinal, demographic and health trends. Termination date: Indefinite. Funding not specified.

COUNTRY: Indonesia **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. CDC Field Epidemiology Training Program. Funding not specified.

COUNTRY: Israel **SUBJECT**: Biomedical Sciences
EIF DATE: 05/06/85 **TERM DATE**: 01/08/94
REMARKS: MOU Agreement with the Israeli Ministry of Health; covers areas of health manpower and services, health services delivery, health information system, food and drugs, public health and biomedical research. Funding not specified.

COUNTRY: Israel **SUBJECT**: Biomedical Sciences
EIF DATE: 03/01/83 **TERM DATE**: 03/01/90
REMARKS: Activities are under a Plan for Mutual Cooperation with the Ministry of Labor and Social Affairs in the areas of alcohol abuse and alcoholism; covers mutually beneficial exchanges, work-study programs, and joint studies. Funding not specified.

COUNTRY: Italy **SUBJECT**: Biomedical Sciences
EIF DATE: 11/21/77 **TERM DATE**: / /
REMARKS: MOU between HHS and the Italian Ministry of Health in health and biomedicine; renewable every 3 yrs; covers environmental health, cardiovascular and pulmonary diseases, cancer, biomedical communication, infectious disease, immunizations. Funding not specified.

COUNTRY: Italy **SUBJECT**: Biomedical Science
EIF DATE: 08/02/68 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. Exchange of information. Interlibrary exchange. Funding not specified.

COUNTRY: Japan **SUBJECT**: Biomedical Sciences
EIF DATE: 04/01/65 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. US-Japan Cooperative Medical Sciences Program; projects divided into 9: Cholera and like diarrheas, Immunology, Leprosy/Hansen's Disease, Malnutrition, Parasitic diseases, Tuberculosis, viral diseases, environment, mutagenesis and carg, v.hepetitis. Funding not specified.

COUNTRY: Japan **SUBJECT**: Biomedical Sciences
EIF DATE: 04/01/76 **TERM DATE**: 01/01/91
REMARKS: Vision research; agreement between the National Eye Institute and the Japan Society for the Promotion of Science. Funding not specified.

COUNTRY: Japan **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE:** 11/14/92
REMARKS: Gerontology research; agreement between the National Institute on Aging and the Tokyo Metropolitan Institute of Gerontology. Funding not specified.

COUNTRY: Japan **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/84 **TERM DATE:** 05/01/94
REMARKS: N.C.I. and Japan Society for the Promotion of Science for cooperation in the area of cancer research. Funding not specified.

COUNTRY: Japan **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement; quid pro quo interlibrary exchanges. Funding not specified.

COUNTRY: Japan **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/80 **TERM DATE:** 06/01/93
REMARKS: Projects under non-energy umbrella S&T agreement; exchanges, work-study programs, joint research; covers cardiovascular diseases, laboratory animals, toxicology, recombinant DNA, vaccine development, antiviral agents, and alcohol-related problems. Funding not specified.

COUNTRY: Japan **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE:** 01/01/91
REMARKS: Agreement between NIH/NEI and the Japan Society for the Promotion of Science on vision research. Funding not specified.

COUNTRY: Kenya **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/79 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Malaria research by the Center for Disease Control and collaborating Kenyan agencies. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** 12/31/90
REMARKS: Field epidemiology training by the Centers for Disease Control with the Secretaria de Salud. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Biomedical Sciences
EIF DATE: 06/30/76 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with Centro Nacional de Informacion y Documentacion en Salud (CENIDS); quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE**: 11/01/92
REMARKS: Plan for Scientific Coop between NIH and the Center for Research and Advanced Studies, National Polytechnic Institute, Mexico (CINVESTAV IPN); covers neurosciences and endocrinology, neurobiology and anaesthesiology, molecular aging, liver metabolism. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE**: 09/01/91
REMARKS: International collaborative effort on Perinatal and Infant Mortality with Denmark, Germany, Israel, Japan, Norway, Sweden and United Kingdom by the National Center for Health Statistics/CDC. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Biomedical Sciences
EIF DATE: 03/01/79 **TERM DATE**: 09/01/91
REMARKS: Child survival and combatting childhood communicable diseases; Centers for Disease Control program of training and logistics planning for advancement of childhood immunization programs in 21 countries. Funding not specified.

COUNTRY: Pakistan **SUBJECT**: Biomedical Sciences
EIF DATE: 06/01/86 **TERM DATE**: / /
REMARKS: Science cooperation under US-Pakistan S&T Agreement includes prevention of blindness, parasitic diseases, health stats, health services research, cancer, cardiovascular diseases, maternal and child health. Termination date: Indefinite. Funding not specified.

COUNTRY: Peru **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/88 **TERM DATE**: / /
REMARKS: Active indefinitely. CDC Field Epidemiology Training Program. Funding not specified.

COUNTRY: Philippines **SUBJECT:** Biomedical Sciences
EIF DATE: 06/01/87 **TERM DATE:** / /
REMARKS: Centers for Disease Control and Dept. of Health program in field epidemiology training (USAID funded). Termination date: Indefinite.

COUNTRY: Poland **SUBJECT:** Biomedical Sciences
EIF DATE: 10/01/84 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Agreement between HHS and Polish Ministry of Health and Social Welfare; cooperation on mental health problems; cardiovascular and pulmonary diseases, individual health scientist exchanges, cancer research, mental health, and Child health. Funding not specified.

COUNTRY: Poland **SUBJECT:** Biomedical Science
EIF DATE: 10/08/87 **TERM DATE:** 10/08/92
REMARKS: Epidemiological, basic, and clinical investigations in the field of cancer. Funding not specified.

COUNTRY: Regional **SUBJECT:** Biomedical Science
EIF DATE: 10/26/77 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. NIH/National Library of Medicine MEDLARS Agreement for interlibrary exchanges. Funding not specified.

COUNTRY: Romania **SUBJECT:** Biomedical Sciences
EIF DATE: 12/01/74 **TERM DATE:** / /
REMARKS: US-Romania cooperation and individual health scientist exchanges; renewable every two years. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Biomedical Sciences
EIF DATE: 10/01/86 **TERM DATE:** 12/31/93
REMARKS: CDC field epidemiology training program. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Biomedical Sciences
EIF DATE: 09/01/74 **TERM DATE:** 09/01/90
REMARKS: Under US-Saudi Joint Commission economic cooperation to enable sharing of knowledge and transfer of technology for food and drug control and emergency medical services. Funding not specified.

COUNTRY: Sierra Leone **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/82 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. Long-term agreement between Centers for Disease Control and Ministry of Health in joint research for viral hemorrhagic fevers. Funding not specified.

COUNTRY: Spain **SUBJECT**: Biomedical Services
EIF DATE: 11/04/84 **TERM DATE**: / /
REMARKS: Allows PHS scientists to participate in the US-Spain S&T program in which some funding for US base rights in Spain is being used to support bilateral cooperative research projects involving both US and Spanish scientists. Termination date: Indefinite. Funding not specified.

COUNTRY: Spain **SUBJECT**: Biomedical Sciences
EIF DATE: 09/01/84 **TERM DATE**: 06/01/91
REMARKS: CDC agreement with Fondo de Investigaciones Sanitarias de la Seguridad Social for collaborative research on toxic oil syndrome. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Biomedical Sciences
EIF DATE: 10/20/74 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with Karolinska Institute; quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Switzerland **SUBJECT**: Biomedical Sciences
EIF DATE: 02/21/80 **TERM DATE**: / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the Documentation Service of the Swiss Academy of Medical Sciences; quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Taiwan **SUBJECT**: Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE**: / /
REMARKS: CDC Field Epidemiology Training Program. Termination date: Indefinite. Funding not specified.

COUNTRY: Thailand **SUBJECT**: Biomedical Sciences
EIF DATE: 04/01/84 **TERM DATE**: 04/01/89
REMARKS: NIH activity under S&T Agreement for aplastic anemia. Funding not specified. Presently being renewed.

COUNTRY: Thailand **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/80 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. CDC Field Epidemiology Training Program. Funding not specified.

COUNTRY: Thailand **SUBJECT:** Biomedical Sciences
EIF DATE: 03/01/90 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. CDC and the Ministry of Health collaboration in HIV-1 and HIV-2 epidemiology, laboratory surveillance and research. Funding not specified.

COUNTRY: USSR **SUBJECT:** Biomedical Sciences
EIF DATE: 05/01/72 **TERM DATE:** 05/01/92
REMARKS: Under government-to-government health agreement on cancer, cardiovascular disease, environmental health, arthritis, biomedical communication, eye disease and individual health scientist exchange. Funding not specified.

COUNTRY: USSR **SUBJECT:** Biomedical Sciences
EIF DATE: 06/28/74 **TERM DATE:** 06/28/92
REMARKS: Agreement between NHLBI and the Ministry of Health, All Union Center for Cardiological Research, for cooperation on artificial heart research and development. Funding not specified.

COUNTRY: United Kingdom **SUBJECT:** Biomedical Sciences
EIF DATE: 06/25/74 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. National Library of Medicine MEDLARS Agreement with the British Library; quid pro quo interlibrary exchange. Funding not specified.

COUNTRY: Yugoslavia **SUBJECT:** Biomedical Sciences
EIF DATE: 11/01/79 **TERM DATE:** 11/01/92
REMARKS: Under US-Yugoslavia S&T Cooperation Agreement, cooperation on: Cardiopulmonary research, metabolic diseases, neurosciences, cancer, human reproduction, alcohol research and individual health, scientist exchanges. Funding not specified.

COUNTRY: Zaire **SUBJECT:** Biomedical Sciences
EIF DATE: 01/01/84 **TERM DATE:** / /
REMARKS: Termination date: Indefinite. Program among CDC, Belgian Ministry of Health, Belgian Institute of Tropical Medicine, U.S. Armed Forces Institute of Pathology, and NIH to cooperate on AIDS surveillance, research, and prevention. Funding not specified.

Department of Interior: BLM

COUNTRY: Canada **SUBJECT**: Natural Resources
EIF DATE: 01/01/61 **TERM DATE**: / /
REMARKS: North American Forestry Commission; Exchange information and advise the FAO Committee on Forestry concerning forest and wildfire management practices. Funding not specified.

COUNTRY: Japan **SUBJECT**: Natural Resources
EIF DATE: 10/24/68 **TERM DATE**: / /
REMARKS: United States/Japan Natural Resources (UJNR) Forestry Panel--Exchange scientific and technical information concerning utilization and enhancement of forest products. No funding specified.

COUNTRY: Mexico **SUBJECT**: Natural Resources
EIF DATE: 01/01/61 **TERM DATE**: / /
REMARKS: North American Forestry Commission; Exchange information and advise the FAO Committee on Forestry concerning forest and wildfire management practices. Funding not specified.

Department of Interior: Bur. Reclamation

COUNTRY: Israel **SUBJECT**: Natural Resources
EIF DATE: 06/01/84 **TERM DATE**: 05/22/94
REMARKS: S&T exchange program in water resources with the Ministry of Agriculture; joint funding.

COUNTRY: Israel **SUBJECT**: Natural Resources
EIF DATE: 02/08/90 **TERM DATE**: 02/07/95
REMARKS: S&T exchange program in water resources with the Israel Oceanographic and Limnological Research, Ltd.; joint funding.

Department of Interior: FWS

COUNTRY: Canada **SUBJECT**: Natural Resources
EIF DATE: 03/16/88 **TERM DATE**: / /
REMARKS: Tripartite cooperation on waterfowl and wetlands conservation. Funding not specified.

COUNTRY: Canada **SUBJECT**: Natural Resources
EIF DATE: 03/16/88 **TERM DATE**: / /
REMARKS: Tripartite (Mexico) cooperation on waterfowl and wetlands cooperation. Funding not specified.

COUNTRY: China **SUBJECT:** Natural Resources
EIF DATE: 11/19/86 **TERM DATE:** 11/19/91
REMARKS: Exchange of scientists to work on activities relating to conservation of wildlife and their habitats. Funding not specified.

COUNTRY: Egypt **SUBJECT:** Natural Resources
EIF DATE: 08/10/87 **TERM DATE:** 10/01/92
REMARKS: Training and research; technical assistance in natural areas management. This is one of three Special Foreign Currency programs run by the FWS (India, Pakistan) in which excess foreign currency is held by the FWS for use in conservation programs. Funding not specified.

COUNTRY: India **SUBJECT:** Natural Resources
EIF DATE: 01/01/78 **TERM DATE:** / /
REMARKS: Research projects in endangered species; training in management;public education efforts including development of the Indian Wildlife Institute. This is one of three Special Foreign Policy programs run by the FWS (Egypt, Pakistan). Funding not specified.

COUNTRY: Mexico **SUBJECT:** Natural Resources
EIF DATE: 03/16/88 **TERM DATE:** / /
REMARKS: Tripartite cooperation on waterfowl and wetlands conservation. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Natural Resources
EIF DATE: 05/12/84 **TERM DATE:** 05/11/94
REMARKS: Cooperative projects on endangered, migratory birds, law enforcement, training, and other wildlife matters. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Natural Resources
EIF DATE: 01/01/87 **TERM DATE:** / /
REMARKS: Training & research in 13 Near East countries; 12 grants in support of biological diversity; USAID funding at $186,000.

COUNTRY: Multilateral **SUBJECT:** Natural Resources
EIF DATE: 04/30/42 **TERM DATE:** / /
REMARKS: Institution building & training in Western hemisphere countries; grants & projects in support of regional capabilities for managing wildlife, environmental education, graduate program development; technical information data centers. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Natural Resources
EIF DATE: 01/01/87 **TERM DATE**: / /
REMARKS: Training & research in 8 Asian countries; 8 grants in support of biological diversity; USAID funding at $260,000.

COUNTRY: Pakistan **SUBJECT**: Natural Resources
EIF DATE: 01/01/78 **TERM DATE**: 12/01/92
REMARKS: Research in endangered species; training in wildlife management; conservation education. One of three Special Foreign Currency programs run by the FWS(Egypt,India) in which excess foreign currency is held by the FWS for use in conservation projects. Funding not specified.

COUNTRY: Canada **SUBJECT**: Nature Conservation
EIF DATE: 07/17/87 **TERM DATE**: / /
REMARKS: To conserve, through joint cooperation and coordination of users and management authorities the migrating Porcupine Caribou Herd. Funding not specified.

Department of Interior: NPS

COUNTRY: Burma **SUBJECT**: Natural Resources
EIF DATE: 09/30/87 **TERM DATE**: / /
REMARKS: Technical assistance in conservation, resource management, and protected areas management; funding of $23,000. This project originally funded at $60,000; because of problems in Burma, funds were returned to USAID/India. Funding now unsure. May expand to Pakistan and India.

COUNTRY: China **SUBJECT**: Natural Resources
EIF DATE: 11/19/86 **TERM DATE**: 11/19/91
REMARKS: Protocol designed to promote cooperation and exchanges in the field of wildlife conservation and protected natural areas. Funding not specified.

COUNTRY: India **SUBJECT:** Heritage Site Planning
EIF DATE: 05/18/89 **TERM DATE:** 05/18/94
REMARKS: Current projects include: Joint tourism studies, development and site conservation plans for Agra, Buddhist Heritage sites and World Heritage sites at Ajanta and Ellora. Funding not specified.

COUNTRY: Japan **SUBJECT:** Natural Resources
EIF DATE: 11/01/86 **TERM DATE:** 11/01/91
REMARKS: US-Japan exchange agreement on development and utilization of natural resources. US-Japan Panels: Natural areas, conservation, recreation and parks, city parks and urban affairs. Funding not specified.

COUNTRY: Mexico **SUBJECT:** National Parks
EIF DATE: 11/30/88 **TERM DATE:** 11/30/93
REMARKS: Mutual objectives/interests declared in the Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere of 10-20-40, World Heritage/cross border resource issues. No funding specified.

COUNTRY: Multilateral **SUBJECT:** Natural Resources
EIF DATE: 02/05/67 **TERM DATE:** 09/30/91
REMARKS: Technical assistance; national park development; participants include African countries. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Natural Resources
EIF DATE: 06/21/84 **TERM DATE:** 05/31/94
REMARKS: Policy coordination; World Heritage Site nomination; cultural resource cooperation with ICOMOS; participation with World Heritage Convention countries in cooperative programs of site assistance and staff training. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Natural Resources
EIF DATE: 09/22/86 **TERM DATE:** 09/22/91
REMARKS: Peace Corps Volunteer training in national parks & conservation; participants include Malawi, Morocco and Sierra Leone; other U.S. Government funding of $18,000.

COUNTRY: Multilateral **SUBJECT**: Natural Resources
EIF DATE: 10/12/40 **TERM DATE**: / /
REMARKS: Ongoing agreement. Western Hemisphere Convention 1/18/90 S.P.A.W. Protocol. Technical assistance; participants include Argentina, Barbados, Bermuda, Brazil, British Virgin Islands, Chile, Colombia, Costa Rica, Grenada, Jamaica, Mexico, Panama, Peru, St. Vincent and the Grenadines. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Natural Resources
EIF DATE: 03/09/84 **TERM DATE**: 03/09/90
REMARKS: Technical assistance/information exchange; Man and the Biosphere (MAB) Program; includes Canada, Mexico, Rwanda, Germany and all MAB countries; other US Government funding of $30,500.

COUNTRY: Pakistan **SUBJECT**: Natural Resources
EIF DATE: 09/30/86 **TERM DATE**: 11/02/93
REMARKS: Technical assistance and training; national/cultural heritage conservation and management technical assistance; wildlife conservation training; operations are conducted under the auspices of the referenced agreement; there is no separate NPS agreement. Funding not specified.

COUNTRY: Poland **SUBJECT**: Natural Resources
EIF DATE: 09/01/87 **TERM DATE**: 09/01/92
REMARKS: Cooperation and exchange; natural and cultural heritage conservation and management; personnel; information exchange. Funding not specified.

COUNTRY: Sri Lanka **SUBJECT**: Natural Resources
EIF DATE: 06/01/84 **TERM DATE**: 09/30/89
REMARKS: Training and technical assistance; Mahaweli protected area management; USAID funding of $500,000. Expired and under renegotiation.

COUNTRY: Thailand **SUBJECT**: Natural Resources
EIF DATE: 04/01/84 **TERM DATE**: 04/01/89
REMARKS: Training and technical assistance in national parks; USAID funding of $53,000.

COUNTRY: Thailand **SUBJECT**: Protected Area Management
EIF DATE: 11/08/89 **TERM DATE**: 11/08/92
REMARKS: Technical assistance and training in management, planning, policies, and guidelines, resource management, interpretation and infrastructure assessment capabilities under auspices of NPS/USAID PASA. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Environment
EIF DATE: 07/21/86 **TERM DATE**: 07/21/91
REMARKS: World Heritage Convention; conservation of protected landscapes, undeveloped coastline, privately owned land; development of trails and voluntary conservation agreement mechanisms; role of public and private sectors in conservation. Funding not specified.

Department of Interior: U.S.G.S.

COUNTRY: Argentina **SUBJECT**: Earth Sciences
EIF DATE: 12/29/87 **TERM DATE**: 12/29/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Australia **SUBJECT**: Earth Sciences
EIF DATE: 01/01/83 **TERM DATE**: 01/01/92
REMARKS: Fieldwork on impact structures in S. Australia, N. Territory, NSW, and W. Australia. Funded by NASA: $40,700.

COUNTRY: Australia **SUBJECT**: Earth Sciences
EIF DATE: 05/01/83 **TERM DATE**: / /
REMARKS: Continuing agreement. Cooperative mineral resources assessments, paleoseismological investigations of surface-rupturing faults; ground-water studies; international strategic minerals inventory. USGS: $51,500; GOA: $7,000.

COUNTRY: Bangladesh **SUBJECT**: Earth Sciences
EIF DATE: 05/01/82 **TERM DATE**: 01/01/95
REMARKS: For modernization of Geological Survey and training of staff. Funded by Asian Development Bank at $522,000 in FY 1990.

COUNTRY: Bolivia **SUBJECT**: Earth Sciences
EIF DATE: 08/17/84 **TERM DATE**: 08/12/94
REMARKS: To establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

Appendix II: Department of Interior: U.S.G.S.

COUNTRY: Bolivia **SUBJECT**: Earth Sciences
EIF DATE: 12/08/89 **TERM DATE**: 12/08/91
REMARKS: Geologic and mineral resources assessment project. Funded by Trade and Development Program: $270,000.

COUNTRY: Botswana **SUBJECT**: Earth Sciences
EIF DATE: 08/13/86 **TERM DATE**: 08/12/94
REMARKS: To establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Earth Sciences
EIF DATE: 05/05/86 **TERM DATE**: 05/05/94
REMARKS: To establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Bulgaria **SUBJECT**: Basic Sciences
EIF DATE: 02/09/78 **TERM DATE**: 02/09/93
REMARKS: Joint research, seminars and workshops, and short-term project development visits. Funding not specified.

COUNTRY: Cameroon **SUBJECT**: Earth Sciences
EIF DATE: 11/09/88 **TERM DATE**: 11/09/93
REMARKS: Measurement of gas recharge rate and thermal fluids of Lakes Nyos and Monoun. USGS: $5,2000; National Geographic, USAID, and Cameroon Government: $14,100.

COUNTRY: Canada **SUBJECT**: Earth Sciences
EIF DATE: 01/31/86 **TERM DATE**: 04/01/91
REMARKS: Atmospheric deposition: Standardization of monitoring equipment and procedures; Canada provides estimated $20,000 in funding.

COUNTRY: Canada **SUBJECT**: Earth Sciences
EIF DATE: 04/02/81 **TERM DATE**: 04/01/91
REMARKS: Joint geological, hydrological, and mapping projects; international strategic minerals inventory. USGS funding: $120,000.

COUNTRY: Canada **SUBJECT**: Earth Sciences
EIF DATE: 01/01/09 **TERM DATE**: / /
REMARKS: Entry into Force: 1909, and continuing. Joint water data acquisition activities stemming from the Boundary Waters Treaty of 1909. Funded by IJC at about $500,000.

COUNTRY: Canada **SUBJECT**: Earth Sciences
EIF DATE: 09/01/89 **TERM DATE**: / /
REMARKS: Entry into Force: 1989, and continuing. Joint studies of hydrologic impacts of climate change in Red River Basin, Canada. Canada funds their own participation. USGS funding: $90,000.

COUNTRY: Chile **SUBJECT**: Earth Sciences
EIF DATE: 04/01/87 **TERM DATE**: 09/30/90
REMARKS: Seismic zoning and implementation of improved earthquake resistant designs. Funded by AID/OFDA at $33,600.

COUNTRY: Chile **SUBJECT**: Earth Sciences
EIF DATE: 09/16/87 **TERM DATE**: 08/02/92
REMARKS: Mineral resource study of Taitao Peninsula. USGS funding: $8,600,000; Colorado School of Mines: $2,100.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 04/15/85 **TERM DATE**: 04/30/91
REMARKS: Survey and Mapping Protocol; joint projects in mapping applications of remote sensing; development of geographic information systems and geographic names databases in cooperation with DMA & NOAA. USGS Funding: $3,2000.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 01/23/95
REMARKS: Earthquake Studies Protocol; studies on crustal structures in fault zones; premonitory phenomena; crustal stress measurements; seismic networks; rock mechanics; intraplate active fault studies. USGS Funding: $35,000; PRC: $75,000.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 10/17/81 **TERM DATE**: 10/17/91
REMARKS: Surface Water Hydrology Protocol; joint research in sediment transport, hydrologic extremes, hydrologic measurements; ice and snow hydrology. USGS funding: $65,000; PRC: $65,000.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 04/30/91
REMARKS: Earth Science Protocol; joint research on pyrophylite; geochemical anomalies in Xinjiang and SW U.S.; genetic model of Bayan Obo iron niobium rare earth deposit; S. China and W. U.S. granitoid rocks. USGS funding: $13,000; PRC: $20,000.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 04/30/91
REMARKS: Protocol under S&T umbrella agreement; joint program with NSF. Funding not specified.

COUNTRY: Colombia **SUBJECT**: Earth Sciences
EIF DATE: 06/22/84 **TERM DATE**: 06/22/89
REMARKS: Provides for exchanges of scientific and technical information and exchange visits by scientists. New agreement being negotiated. Funding not specified.

COUNTRY: Cote D'Ivoire **SUBJECT**: Earth Sciences
EIF DATE: 03/21/86 **TERM DATE**: / /
REMARKS: Establishes a station for the reference network. Funding not specified.

COUNTRY: Cote D'Ivoire **SUBJECT**: Earth Sciences
EIF DATE: 02/01/86 **TERM DATE**: 01/31/94
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Finland **SUBJECT**: Earth Sciences
EIF DATE: 10/25/89 **TERM DATE**: 10/25/94
REMARKS: Scientific and technical cooperation; no activity in FY 1990. Funding not specified.

COUNTRY: France **SUBJECT**: Earth Sciences
EIF DATE: 07/23/88 **TERM DATE**: 07/23/91
REMARKS: Joint studies in water resources research, radioactive waste, oceanographic research, geochemistry research, mineral deposits, geophysics, and sea ice research and remote sensing in polar regions. USGS funding: $26,5000; France: $4,000.

COUNTRY: Germany **SUBJECT**: Earth Sciences
EIF DATE: 07/01/75 **TERM DATE**: 07/16/91
REMARKS: Joint research in marine seismology, radioactive wastes, petroleum resource assessment and Antarctic studies; sea ice studies, marine minerals; international strategic minerals inventory. Funding not specified.

COUNTRY: Hungary **SUBJECT**: Earth Sciences
EIF DATE: 02/09/88 **TERM DATE**: 12/31/92
REMARKS: Cooperative magnetostratigraphic studies; assist Hungarian earth science agencies in reorganization efforts. USGS funding: $5,000; Hungary: $2,800.

COUNTRY: Iceland **SUBJECT**: Earth Sciences
EIF DATE: 04/09/82 **TERM DATE**: 04/08/90
REMARKS: Agreement in cooperation with the National Research Council; information and personnel exchanges; joint research in geophysical, geological, and hydrological phenomena. In renewal process. Funding not specified.

COUNTRY: India **SUBJECT**: Earth Sciences
EIF DATE: 01/01/75 **TERM DATE**: / /
REMARKS: Continuing. Research projects on Upper Mantle conductivity; seismic tomography for lithospheric studies and land reclamation. Administered by the State Department. US-India fund provides about $20,000. USGS funding: $11,000.

COUNTRY: Indonesia **SUBJECT**: Earth Sciences
EIF DATE: 01/01/87 **TERM DATE**: / /
REMARKS: Cooperative research on peat studies as modern analogs to U.S. coal fields. Continuing agreement. USGS funding: $5,000.

COUNTRY: Israel **SUBJECT**: Earth Sciences
EIF DATE: 05/01/85 **TERM DATE**: 05/01/95
REMARKS: Global Digital Seismic Network. Funding not specified.

COUNTRY: Italy **SUBJECT**: Earth Sciences
EIF DATE: 11/06/85 **TERM DATE**: 11/05/90
REMARKS: Program under S&T umbrella agreement; development and installation of digital real-time seismographs; hydrological hazards workshop; development of new technology. $97,000 GOI and other funding. Renewal for 5-yr. period effective 11/5/90 being pursued.

COUNTRY: Italy **SUBJECT**: Earth Sciences
EIF DATE: 06/07/84 **TERM DATE**: 06/07/89
REMARKS: Installation of digital real-time seismography. In renewal process for another 5 years, effective 06/07/89. Funding not specified.

Appendix II: Department of Interior: U.S.G.S.

COUNTRY: Italy **SUBJECT**: Earth Sciences
EIF DATE: 12/01/83 **TERM DATE**: 11/30/88
REMARKS: MOU renewal for 5 years' period, effective 12/1/88, sent to Italy in 1989 for signatures; but presently unsigned. Original agreement refers to cooperative activities related to marine sediment transport and hydrologic and hazard seminars. Funding not specified

COUNTRY: Japan **SUBJECT**: Earth Sciences
EIF DATE: 10/28/88 **TERM DATE**: 10/28/91
REMARKS: Debris flow research; experimental studies of bedform alignment related to sediment transport studies on continental shelves and in estuaries. Japan provides approximately $37,800.

COUNTRY: Japan **SUBJECT**: Earth Sciences
EIF DATE: 02/25/85 **TERM DATE**: 10/28/91
REMARKS: Geothermal and mineral resources research; advise GOJ on design of thermal infrared multispectral imaging instrument. USGS funding: $38,000; NASA: $35,600.

COUNTRY: Jordan **SUBJECT**: Earth Sciences
EIF DATE: 09/01/82 **TERM DATE**: 01/31/91
REMARKS: Seismic network program, remote sensing; funded by USAID at $263,000.

COUNTRY: Kenya **SUBJECT**: Earth Sciences
EIF DATE: 04/01/90 **TERM DATE**: 03/31/91
REMARKS: Kenya International Seismic Project. To investigate deep seismic structures of the East African Rift. USGS funding: $52,000; NSF: $37,000.

COUNTRY: Korea **SUBJECT**: Earth Sciences
EIF DATE: 10/01/89 **TERM DATE**: 09/01/93
REMARKS: Cooperative research on origin and evolution of marine minerals, joint research cruises, exchange visits and laboratory analyses. USGS funding: $250,000.

COUNTRY: Kuwait **SUBJECT**: Earth Sciences
EIF DATE: 12/04/88 **TERM DATE**: 12/31/93
REMARKS: No activities in FY 1990. Funding not specified.

COUNTRY: Liberia **SUBJECT**: Earth Sciences
EIF DATE: 03/20/86 **TERM DATE**: 03/20/91
REMARKS: No activity in FY 1990. No funding specified.

Appendix II: Department of Interior: U.S.G.S.

COUNTRY: Mauritania **SUBJECT:** Earth Sciences
EIF DATE: 01/11/87 **TERM DATE:** 01/11/92
REMARKS: No activity in FY 1990. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Earth Sciences
EIF DATE: 03/31/89 **TERM DATE:** 03/31/94
REMARKS: Scientific cooperation and exchange in geothermal and related volcanic investigations. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Earth Sciences
EIF DATE: 07/01/90 **TERM DATE:** 07/01/91
REMARKS: Use of PCs for change detection and map revision with satellite data. US-Mexico S&T Agreement ($25,000) and USGS-CETENAL MOU and DMA IAGS. USGS funding: $4,000, .05 FTE.

COUNTRY: Mexico **SUBJECT:** Earth Sciences
EIF DATE: 08/26/90 **TERM DATE:** 08/01/91
REMARKS: Research programs in seismology with National University of Mexico. USGS funding: $47,000; Mexico: $1,800.

COUNTRY: Mozambique **SUBJECT:** Earth Sciences
EIF DATE: 04/10/86 **TERM DATE:** 04/09/91
REMARKS: No activity in FY 1990. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Earth Sciences
EIF DATE: 01/01/66 **TERM DATE:** / /
REMARKS: Acquisition of geodetic and gravity data; aerial photography; satellite imagery and production of maps. SCAR Library for Geodesy and Geographic Information. USGS: $40,000, 8.5 FTE. NSF: $60,000.

COUNTRY: Multilateral **SUBJECT:** Earth Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Continuing agreement. SW and W. Pacific: One USGS employee in Fiji for advice and training in marine geoscientific hydrocarbon studies and coastal geologic hazards and resources. USGS funding: $70,000.

COUNTRY: Multilateral **SUBJECT:** Earth Sciences
EIF DATE: 01/01/74 **TERM DATE:** / /
REMARKS: Continuing agreement. Circum-Pacific Map Project: Coordination and cartographic preparation of 60 thematic maps. USGS funding: $350,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 08/01/86 **TERM DATE**: 07/31/91
REMARKS: Interagency Volcano Early Warning Disaster Assistance Program provides emergency response to volcano crises. USAID funding: $170,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/72 **TERM DATE**: / /
REMARKS: Antarctic glaciological studies, seismology and ultra-long period gravity investigations; data telecommunications at the South Pole. USGS funding: $16,000, 3.2 FTE. Outside support: $16,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 03/01/87 **TERM DATE**: 09/01/91
REMARKS: Famine Early Warning System; development and application of information system technology for target populations in 7 African countries. USAID funding: $450,000, 4.0 FTE.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/88 **TERM DATE**: / /
REMARKS: International Strategic Minerals Inventory: Global Inventory of Strategic Commodities including cobalt, nickel, platinum and titanium. Participants are from Australia, Canada, South Africa, United Kingdom, and West Germany. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/86 **TERM DATE**: / /
REMARKS: Advisory consultations to intergovernmental geoscience bodies in eastern Asia, particularly in resource assessment methodologies; preparation of regional base maps at 1:2,000,000-scale; about $5,000 in travel funds from the Department of State.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 04/01/88 **TERM DATE**: 09/30/91
REMARKS: Remote sensing and information systems for research and monitoring of Sahelian Africa for meterology, hydrology, and agriculture in 8 African countries. USAID funding: $1,700,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/89 **TERM DATE**: 12/31/89
REMARKS: USGS provides technical expertise to UN agencies as requested. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 04/01/87 **TERM DATE**: 09/30/91
REMARKS: Time series monitoring of vegetation conditions of locust habitat in 8 African countries and Saudi Arabia. USAID funding of $200,000, 2.0 FTE.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/80 **TERM DATE**: / /
REMARKS: Continuing agreement. USGS-Air Force Technical Applications Center Program of seismic data collection in New Zealand, Africa and South America. AFTAC Funding: $100,000, 4mm.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 12/31/87 **TERM DATE**: 12/31/90
REMARKS: Geothermal resources assessment of Central America. USAID funding: $27,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 05/30/90 **TERM DATE**: 05/30/92
REMARKS: Training in investigation of gold/silver deposits in Bolivia, Chile, Peru. IDB Funding: $50,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 10/01/89 **TERM DATE**: 11/30/90
REMARKS: Worldwide earthquake risk management program. Pilot program in Morocco, Chile and Indonesia. USAID funding: $47,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 11/01/81 **TERM DATE**: / /
REMARKS: Continuing agreement. International Strategic Mineral Inventory: Global inventory of strategic commodities including cobalt, nickel, platinum, titanium, and lithium. Participants: U.S., Australia, Canada, S. Africa, U.K., and Germany. USGS funding: $60,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 01/01/86 **TERM DATE**: 12/31/90
REMARKS: USGS/New Zealand and 1:50,000-scale topographic mapping in Dry Valley area of Antarctica. USGS funding: $8,000, 1.0 FTE.; NSF: $50,000.

COUNTRY: Multilateral **SUBJECT**: Earth Sciences
EIF DATE: 11/01/87 **TERM DATE**: 01/31/92
REMARKS: Field Research at lakes in dry valleys related to global carbon cycle in Antarctica. NSF grant.

COUNTRY: New Zealand **SUBJECT:** Earth Sciences
EIF DATE: 06/23/86 **TERM DATE:** / /
REMARKS: Joint USGS-New Zealand project to do 1:50,000 scale mapping of regions of high scientific interest in McMurdo Sound area of Antarctica; funded by NSF at $50,000. USGS completed its work on the first 5 sheets which were sent to New Zealand for compilation.

COUNTRY: New Zealand **SUBJECT:** Earth Sciences
EIF DATE: 01/14/90 **TERM DATE:** 01/14/91
REMARKS: Cooperation in structural geology and tectonics with Victoria University. Funding of $31,000 from Victoria University.

COUNTRY: New Zealand **SUBJECT:** Earth Sciences
EIF DATE: 07/01/89 **TERM DATE:** 02/01/90
REMARKS: Ongoing informal scientific cooperative study to develop models for caldera-forming eruptions. Program ongoing depending on availability of funding.

COUNTRY: Norway **SUBJECT:** Earth Sciences
EIF DATE: 02/04/88 **TERM DATE:** 02/04/93
REMARKS: Cooperation in developing methods for digital sonar image data with the Norwegian Institute of Technology. Funding not specified.

COUNTRY: Norway **SUBJECT:** Earth Sciences
EIF DATE: 10/12/89 **TERM DATE:** 10/12/94
REMARKS: Cooperation with Geological Survey of Norway. No activity in FY 1990. Funding not specified.

COUNTRY: Pakistan **SUBJECT:** Earth Sciences
EIF DATE: 08/07/85 **TERM DATE:** 07/31/89
REMARKS: Coal resources exploration and assessment. USAID funding: $1,700,000.

COUNTRY: Paraguay **SUBJECT:** Earth Sciences
EIF DATE: 10/17/88 **TERM DATE:** 08/24/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Poland **SUBJECT:** Earth Sciences
EIF DATE: 08/25/88 **TERM DATE:** 08/25/93
REMARKS: Projects on lignite formation; carbonatites and alkaline intrusions; prospecting for mineral deposits. USGS funding: $21,400; Joint Commission funding: $54,200.

COUNTRY: Portugal **SUBJECT**: Earth Sciences
EIF DATE: 05/18/87 **TERM DATE**: 05/17/92
REMARKS: No activity in FY 1990. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT**: Earth Sciences
EIF DATE: 01/01/63 **TERM DATE**: 12/31/94
REMARKS: Establishment of earth sciences organization; geographic and geologic cartography; mining; geologic, geochemical and geophysical studies; geologic and mineral resources database. Government of Saudi Arabia funding: $4,000,000.

COUNTRY: South Africa **SUBJECT**: Earth Sciences
EIF DATE: 12/01/87 **TERM DATE**: 12/01/92
REMARKS: Establish facilities to be incorporated into Global Seismograph Network. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Earth Sciences
EIF DATE: 07/01/90 **TERM DATE**: 09/01/91
REMARKS: Cooperative research on subsurface problems related to nuclear waste disposal and ground water contamination. USGS funding: $76,000; Sweden: $57,000.

COUNTRY: United Arab Emirates **SUBJECT**: Earth Sciences
EIF DATE: 02/14/88 **TERM DATE**: 02/14/93
REMARKS: Assessment of ground water resources of Abu Dhabi. Funded by Abu Dhabi Emirate at $6 million. In FY 1990: $1,250,000; 9 resident USGS staff and 0.5 man-years TDYs.

COUNTRY: United Kingdom **SUBJECT**: Earth Sciences
EIF DATE: 02/14/84 **TERM DATE**: 09/30/89
REMARKS: Sea floor sonar imagining, surveys using the Geologic Long-Range Inclined Asdic (GLORIA) System. Project funded at $4.5 million. In renewal process for another 5 years effective 09/30/89.

COUNTRY: United Kingdom **SUBJECT**: Earth Sciences
EIF DATE: 11/18/89 **TERM DATE**: 11/15/90
REMARKS: Cooperative research on genesis of basalt with University of Manchester. USGS funding: $46,400.

COUNTRY: United Kingdom **SUBJECT**: Earth Sciences
EIF DATE: 03/15/90 **TERM DATE**: 11/30/90
REMARKS: Analysis and modeling of surface water flows. USGS funding: $9,600.

COUNTRY: United Kingdom **SUBJECT**: Earth Sciences
EIF DATE: 04/12/90 **TERM DATE**: 09/25/90
REMARKS: Informal scientific cooperation on research on mechanisms of volcanic earthquakes. USGS funding provided by a USGS fellowship. Renewal under consideration.

COUNTRY: Venezuela **SUBJECT**: Earth Sciences
EIF DATE: 02/06/87 **TERM DATE**: 02/06/92
REMARKS: Geologic mapping and mineral resources assessment of the Guyana Shield. Funding provided by Venezuela at $500,000 per year.

COUNTRY: Venezuela **SUBJECT**: Earth Sciences
EIF DATE: 03/01/90 **TERM DATE**: 07/01/91
REMARKS: Pilot project on application of satellite data for scale-true mapping in unmapped areas. USGS funding: $8,000; PAIGH: $6,500.

COUNTRY: Yugoslavia **SUBJECT**: Earth Sciences
EIF DATE: 06/27/88 **TERM DATE**: 06/27/93
REMARKS: Projects under the S&T Umbrella Agreement. USGS funding: $6,700; Joint Board: $6,400.

Department of Transportation

COUNTRY: Australia **SUBJECT**: Transportation
EIF DATE: 10/01/68 **TERM DATE**: 10/16/90
REMARKS: Projects and technical exchanges carried out under the US-Australia S&T Agreement. Covers all modes of transport and policy (regulatory) issues. Each side pays costs of its participation.

COUNTRY: Brazil **SUBJECT**: Transportation
EIF DATE: 03/29/84 **TERM DATE**: / /
REMARKS: On-going agreement identified areas for cooperation: Civil aviation; urban mass transit; vehicle fuel conservation and alternative fuel technology; and highway transportation. Funding not specified.

COUNTRY: Canada **SUBJECT**: Transportation
EIF DATE: 06/18/70 **TERM DATE**: / /
REMARKS: Extremely active on-going agreement concerning all areas of transportation: Civil aviation research, marine technology, urban transport, highway/traffic safety; highway research; systems for disabled; hazardous materials transport. Funding not specified.

COUNTRY: China **SUBJECT**: Transportation
EIF DATE: 01/20/87 **TERM DATE**: / /
REMARKS: Ongoing agreement covers all areas of search and rescue cooperation administered by USCG. There were no activities under this agreement in FY90. IPR provision in Governing Agreement. Funding not specified.

COUNTRY: China **SUBJECT**: Transportation
EIF DATE: 05/11/83 **TERM DATE**: 04/13/91
REMARKS: Protocol with Ministry of Communications (MOC) under the umbrella S&T agreement; urban systems; transport research planning; highway construction and safety; civil aviation technical assistance. Army Corps of Engineers participates. Funding not specified.

COUNTRY: China **SUBJECT**: Transportation
EIF DATE: 10/10/86 **TERM DATE**: 05/11/88
REMARKS: Under renewal considerations. Covers all areas of highway transportation, research and development. IPR contained in Governing Agreement. Funding not specified.

COUNTRY: China **SUBJECT**: Transportation
EIF DATE: 12/15/86 **TERM DATE**: 12/15/91
REMARKS: Covers all areas of rail transportation, research, and operations. Administered by the Federal Railroad Administration. Funding not specified.

COUNTRY: China **SUBJECT**: Transportation
EIF DATE: 05/06/87 **TERM DATE**: 05/11/88
REMARKS: Renewal under consideration. Port engineering and waterborne transport. Army Corp of Engineers also participates. Funding decided on a case-by-case basis. IPR contained in Governing Agreement.

COUNTRY: Finland **SUBJECT**: Transportation
EIF DATE: 07/23/81 **TERM DATE**: / /
REMARKS: Ongoing agreement. Icebreaking technology and other subjects as may be agreed. Funding not specified.

COUNTRY: France **SUBJECT**: Transportation
EIF DATE: 10/07/71 **TERM DATE**: / /
REMARKS: Ongoing program implemented with the U.S., France, Germany, Italy, Japan, and U.K. under the auspices of NATO CCMS. Funding: Each side pools funds subject to availability.

COUNTRY: France **SUBJECT:** Transportation
EIF DATE: 02/14/72 **TERM DATE:** / /
REMARKS: Exchanges on automated guideway transit assessment; project agreements include: Automated guideway transit, marine traffic systems and pollution, tunneling technology, urban rail and traffic systems, waste and byproduct. Agreement is on-going. Funding not specified.

COUNTRY: France **SUBJECT:** Transportation
EIF DATE: 06/02/69 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

COUNTRY: France **SUBJECT:** Transportation
EIF DATE: 03/03/69 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

COUNTRY: Germany **SUBJECT:** Transportation
EIF DATE: 09/03/75 **TERM DATE:** / /
REMARKS: Ground transportation, like track mag/lev high speed; advanced transport technologies and related aspects; energy and transport, civil aviation, vessel traffic systems, transport economics and planning. On-going agreement. Funding not specified.

COUNTRY: Germany **SUBJECT:** Transportation
EIF DATE: 11/05/70 **TERM DATE:** / /
REMARKS: Program carried out by the U.S., France, Germany, Italy, Japan, and United Kingdom. Begun under the auspices of NATO CCMS. Continuing agreement. Funding not specified.

COUNTRY: Germany **SUBJECT:** Transportation
EIF DATE: 07/12/78 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

COUNTRY: Germany **SUBJECT:** Transportation
EIF DATE: 06/12/78 **TERM DATE:** / /
REMARKS: On-going agreement with Ministry of Research and Technology (MORT) and Ministry of Transport regarding Development of Advanced Ground Transport- Project Agreement concerning Magnetic Levitation Transport System Safety established in 5/90. Funding not specified.

Appendix II: Department of Transportation

COUNTRY: Hungary **SUBJECT:** Transportation
EIF DATE: 10/11/78 **TERM DATE:** / /
REMARKS: The Department of Transportation received a delegation of Hungarian Railroad officials on the 30th of October where information was exchanged on a wide spectrum of issues from economic policy to high-speed railway. On-going agreement. Funding not specified.

COUNTRY: Israel **SUBJECT:** Transportation
EIF DATE: 11/12/74 **TERM DATE:** / /
REMARKS: On-going. Transportation planning and information systems; and urban transport, including traffic control systems. Funding not specified.

COUNTRY: Italy **SUBJECT:** Transportation
EIF DATE: 04/12/85 **TERM DATE:** 04/12/90
REMARKS: Initial areas of mutual interest: a) Containerization, b) Major infrastructure construction technology, c) Emergency transportation, d) Transportation safety, and e) Intermodal freight transportation. Replaces MOU of 10-03-69. Funding not specified.

COUNTRY: Italy **SUBJECT:** Transportation
EIF DATE: 10/03/69 **TERM DATE:** / /
REMARKS: On-going agreement. Funding not specified.

COUNTRY: Japan **SUBJECT:** Transportation
EIF DATE: 07/31/69 **TERM DATE:** / /
REMARKS: On-going. Major areas are: Urban systems; traffic management; high speed rail, including magnetic levitation; aviation R&D; environment control strategies. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Transportation
EIF DATE: 06/01/89 **TERM DATE:** / /
REMARKS: On-going. Agreement between the United States Coast Guard and the Government of Mexico for cooperation in maritime search and rescue. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Transportation
EIF DATE: 11/16/72 **TERM DATE:** / /
REMARKS: Major areas for cooperation include highway, rail, oil pollution control, and border congestion. On-going agreement. Funding not specified.

Appendix II: Department of Transportation

COUNTRY: Mexico **SUBJECT:** Transportation
EIF DATE: 08/07/89 **TERM DATE:** / /
REMARKS: On-going agreement between the USCG and its Mexican counterpart on cooperation in maritime search and rescue. Communication annex to this agreement has been drafted and is pending approval by both governments. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: 01/01/70 **TERM DATE:** / /
REMARKS: On-going agreement. EUROCONTROL Group: Civil Aviation; management information exchanges on air navigation. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Federal Highway Administration (FHWA) participates in highway projects and technical database coordination. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: European Conference of Ministers of Transport (ECMT); various technical subjects; high-level policy discussions in Council Sessions. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: UN Economic Comission for Europe (ECE): Inland Transport Committee Groups of Experts on Construction of Vehicles (WP 29) and Road Safety (GE 20); Combined Transport (GE 24); Transport of Dangerous Goods (GE 15). Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: On-going. United Nations International Telecommunications Union (ITU); World Administrative Radio Conference for Mobile Services. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: International Union of Railways (UIC); information exchanges; committee projects on rail research; annual membership dues of $40,000 and $6000 travel expenses. Federal Railroad Administration (FRA) participates on Committee of 173 on rail contact fatigue. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: Organization for Economic Cooperation and Development (OECD); DOT represented on Road Transport Research Program Steering Committee and active in selected research studies. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. United Nations International Atomic Energy Agency (IAEA): Standing Advisory Group on Safe Transport of Radioactive Material. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: United Nations Economic and Social Council: Committee of Experts on Transport of Dangerous Goods. Research and Special Program Administration (RSPA) participates in Committee. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: USCG continues active participation in UN's International Maritime Organization (IMO), representing the U.S. in meetings of UNGA, Maritime Safety Committee (MSC), Legal Committee, and the Marine Environment Protection Committee (MEPC). Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Commission Internationale de L'Eclairage - Division 4 - Lighting and Signaling for Transport; development of technical reports, guidelines, and/or standards. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Maritime-special groups: International Association of Lighthouse Authorities; International Working Group on LORAN C; International Ship Structures Cong; International Radio Consultative Commission; Panama Canal Seminar on Tonnage System Changes; Seminars on Marine Pollution and Chemical Tankers and Gas; Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: On-going. United Nations Economic and Social Commission for Asia and the Pacific (ESCAP). Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Maritime Administration (MARAD) participates in Inter-American Port and Harbor Conferences. Agreement between DOT and OAS. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: In 1990 Permanent International Association of Road Congresses (PIARC) and FHWA have worked to upgrade PIARC's treatment of safety, environmental, advanced traffic management, and motor carrier issues. U.S. participation with PIARC tech experts good. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Pan American Highway Congress - Pan American Institute of Highways; training and technology transfer for highway construction to member countries. Funded by Pan American Highway Congress and member countries.

COUNTRY: Multilateral **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: 18th Pan American Railway Congress Association (PARCA) held in Rio de Janeiro.DOT's representative addressed issues on effections of pollution, congestion, and accidents in America as factors that can be mitigated by rail transport. Funding not specified.

Appendix II: Department of Transportation

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. United Nations International Civil Aviation Organization (ICAO); annual Assembly Meetings; 9 Regional Groups; 3 special committees; 13 Panels which have established various ad hoc study groups. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: USCG participates in technology and policy sharing with the Permanent International Association of Navigational Congresses (PIANC). MARAD contributed technical paper addressing critical issues and problems relating to maritime transport. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Transportation
EIF DATE: 09/28/77 **TERM DATE**: / /
REMARKS: On-going agreement concerning transportation economics studies; highway traffic safety; civil aviation; urban systems, drug testing studies. Funding not specified.

COUNTRY: Poland **SUBJECT**: Transportation
EIF DATE: 11/03/71 **TERM DATE**: / /
REMARKS: During 1990 $17,000 U.S. in lab equipment provided to Polish collaborators in on-going research. Three visiting scientists supported during their U.S. visit by the TSC in Cambridge, MA. April 1990, joint 3-day seminar on research was hosted at Kracaw Institute, Poland.

COUNTRY: Regional (Africa) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: Regional highway technical assistance; transport planning and development in cooperation with USAID. Funding not specified.

COUNTRY: Regional (Africa) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Civil aviation technical assistance in Cape Verde, Egypt, Liberia, and Morocco. Funding not specified.

COUNTRY: Regional (Asia) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Highway technical assistance in Kuwait and Turkey. Funding not specified.

COUNTRY: Regional (Asia) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: Civil aviation tech assistance in Australia, Burma, Brunei, China, Hong Kong, ICAO, India, Indonesia, Israel, Japan, Jordan, Korea, Malaysia, Marshall Islands, The Maldives, Micronesia, Nepal, New Zealand, Oman, Pakistan, Palau, The Philippines, etc. Funding not specified.

COUNTRY: Regional (Asia) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Technical assistance to Saudi Arabia on transport system infrastructure establishment and training. Funding not specified.

COUNTRY: Regional (Europe) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: Civil aviation technical assistance in Austria, Belgium, Denmark, EUROCONTROL, Germany, France, Greece, Iceland, Ireland, Italy, the Netherlands, Poland, Portugal, Spain, Switzerland, and the United Kingdom. Programs have various start and end dates. Funding not specified.

COUNTRY: Regional (Oceania) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Highway technical assistance in Indonesia. Funding not specified.

COUNTRY: Regional (S America) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Civil aviation technical assistance in Argentina, Bolivia, Brazil, Chile, Colombia, Ecuador, Peru, Surinam, Uruguay, and Venezuela. Funding not specified.

COUNTRY: Regional (W Hemis) **SUBJECT**: Transportation
EIF DATE: / / **TERM DATE**: / /
REMARKS: On-going. Highway technical assistance in Barbados and Costa Rica. Funding not specified.

Appendix II: Department of Transportation

COUNTRY: Regional (W Hemis) **SUBJECT:** Transportation
EIF DATE: / / **TERM DATE:** / /
REMARKS: Civil aviation technical assistance in Barbados, Bahamas, Canada, Cayman Islands, COCESNA, Dominican Republic, Grenada, Guyana, Haiti, Iceland, Jamaica, Mexico, Netherlands Antilles, Organization of Eastern Caribbean States, Panama, Trinidad and Tobago. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT:** Transportation
EIF DATE: 10/26/83 **TERM DATE:** / /
REMARKS: In 1990 total Transport Project team consisted of 7 employees with 4 professional assigned to Riyadh. Budget of $1.6 Million, Project trains 200 Saudi engineers in highway related topics; completed development of Quality Assurance Program, Automated truck legislation.

COUNTRY: Spain **SUBJECT:** Transportation
EIF DATE: 11/10/71 **TERM DATE:** / /
REMARKS: Transportation planning exchanges; concrete structure research; seismic effects on bridge deck systems; five projects were funded under the US-Spain Agreement of Friendship, Defense and Cooperation, and carried out by U.S. universities. Funding not specified.

COUNTRY: USSR **SUBJECT:** Transportation
EIF DATE: 05/31/88 **TERM DATE:** 05/31/93
REMARKS: Agreement provides for cooperative activities in areas of civil aviation, railroad safety, highway bridge construction and highway and traffic safety programs. The civil aviation program has been extremely active and beneficial to both sides. Funding not specified.

COUNTRY: United Kingdom **SUBJECT:** Transportation
EIF DATE: 05/11/71 **TERM DATE:** / /
REMARKS: On-going. Program implemented by the U.S., France, Germany, Italy, Japan, and United Kingdom. Begun under the auspices of NATO CCMS. Funding not specified.

COUNTRY: United Kingdom **SUBJECT:** Transportation
EIF DATE: 03/09/88 **TERM DATE:** / /
REMARKS: Original agreement altered to indefinite duration on 03-09-88; general transport system planning exchanges; civil aviation security. Funding not specified.

Environmental Protection Agency

COUNTRY: Brazil **SUBJECT:** Environment
EIF DATE: 10/01/86 **TERM DATE:** / /
REMARKS: MOU between EPA and the Brazilian Secretariat of Environment and Institute of Environment and Renewable Natural Resources authorizing cooperative activities in pollution studies and environmental protection.

COUNTRY: Canada **SUBJECT:** Environment
EIF DATE: 11/22/78 **TERM DATE:** / /
REMARKS: US-Canadian Great Lakes Water Quality Agreement, providing for restoration and maintenance of chemical, physical, biological integrity of Great Lakes Basin ecosystem. Implements pollution control objectives of US-Canada Boundary Waters Treaty of 1909. Funding not specified

COUNTRY: Canada **SUBJECT:** Environment
EIF DATE: 10/28/86 **TERM DATE:** 10/28/91
REMARKS: MOU on transboundary movement of hazardous wastes for treatment, storage or disposal. It has proven very effective in providing notification, tracking, and control of hazardous waste shipments between the U.S. and Canada. Funding not specified.

COUNTRY: Canada **SUBJECT:** Environment
EIF DATE: 02/04/87 **TERM DATE:** / /
REMARKS: Declarations of intent on toxic pollution of Niagara River and Lake Ontario. EPA, Environment Canada, NY State Department of Environmental Conservation and the Ontario Ministry of Environment entered into agreement; also on Boundary Waters Treaty of 1909. Funding not specified.

COUNTRY: Canada **SUBJECT:** Environment
EIF DATE: 10/17/85 **TERM DATE:** 10/17/90
REMARKS: MOU with Canada, providing framework for cooperation on S&T exchange. Includes pollution measurements and control, R&D of improved technologies and systems for pollution control. Very active and productive agreement which will be renewed. Funding not specified.

COUNTRY: Canada **SUBJECT**: Environment
EIF DATE: 10/17/85 **TERM DATE**: / /
REMARKS: EPA-Environment Canada MOU of accidental and unauthorized discharges of pollutants along inland boundary. Contains plans to deal with accidental releases of pollutants, joint contingency plan for inland border areas of the Great Lakes and maritime areas. Funding not specified.

COUNTRY: China **SUBJECT**: Environment
EIF DATE: 02/05/80 **TERM DATE**: 04/30/91
REMARKS: US-PRC Protocol on Environmental Cooperation, extended to co-terminate with S&T agreement, involves five on-going projects--health effects, air pollution, soil and ground pollution, climate change and CFC chemical and technology substitutes. Funding not specified.

COUNTRY: Germany **SUBJECT**: Environment
EIF DATE: 05/09/74 **TERM DATE**: / /
REMARKS: Self-renewing agreement with the German Ministry of Environment, Nature Proctection, and Nuclear Safety; cooperation on auto emissions, acid deposition, economic incentives, regulatory approaches, emission and effluent control technologies, chemical and pesticide regulations. Funding not specified.

COUNTRY: India **SUBJECT**: Environment
EIF DATE: 11/01/86 **TERM DATE**: / /
REMARKS: Under US-India Fund for Educational, Cultural and Scientific Cooperation, EPA is collaborating with the GOI in studies addressing ozone depletion and the health effects of particulate air pollutants. Funding not specified.

COUNTRY: Italy **SUBJECT**: Environment
EIF DATE: 03/01/87 **TERM DATE**: / /
REMARKS: Self-renewing MOU between EPA and the Italian Ministry of the Environment; priority areas include hazardous and municipal solid waste management, environmental technologies, accident prevention and research. Funding not specified.

COUNTRY: Japan **SUBJECT**: Environment
EIF DATE: 08/05/75 **TERM DATE**: / /
REMARKS: Self-renewing governmental agreement includes 14 cooperative projects dealing with sewerage treatment, water conservation and flow reduction, air pollution related meterology, and photochemical air pollution. Funding not specified.

COUNTRY: Korea **SUBJECT**: Environment
EIF DATE: / / **TERM DATE**: / /
REMARKS: An MOU between EPA and the Korean Environment Agency was agreed to in November 1987. The agreement has not been implemented because IPR issues have held up the signing of the formal US-ROK agreement. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Environment
EIF DATE: 08/14/88 **TERM DATE**: / /
REMARKS: US-Mexican governmental agreement for cooperation in the protection, improvement and conservation of the border environment. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Environment
EIF DATE: 10/04/89 **TERM DATE**: / /
REMARKS: Agreement to protect and improve the environment in Mexico City focussing initially on air quality, water quality, waste management, health aspects of environmental pollution, and sustainable development. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Environment
EIF DATE: 01/01/83 **TERM DATE**: / /
REMARKS: Governmental agreement for cooperation in the protection, improvement and conservation of the border environment. Currently developing joint strategy to limit transboundary air pollution in the El Paso/Ciudad Juarez area. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Environment
EIF DATE: 06/17/85 **TERM DATE**: 06/17/90
REMARKS: Self-renewing (every 5 yrs.) MOU with the Ministry of Housing, Physical Planning, and Environment; includes work on integrated planning, enforcement, air quality, economic incentives, water quality. EPA and the Ministry co-sponsor symposium on air-related enforcement. Funding not specified.

COUNTRY: Nigeria **SUBJECT:** Environment
EIF DATE: 09/22/90 **TERM DATE:** / /
REMARKS: MOU between the Nigerian Ministry of Housing and Environment provides EPA assistance to the MHE when requested and based on domestic priorities. Government of Nigeria reimburses EPA for services.

COUNTRY: Poland **SUBJECT:** Environment
EIF DATE: 09/10/87 **TERM DATE:** 09/10/92
REMARKS: EPA and the Ministry of Environment agreement on research, demonstration projects and workshops on environmental policy and management, water quality modeling, hazardous waste management, radionuclide migration in food chain, wastewater and air pollution work. Funding not specified.

COUNTRY: USSR **SUBJECT:** Environment
EIF DATE: 05/23/72 **TERM DATE:** / /
REMARKS: EPA and Goskompriroda are lead agencies for this self-renewing governmental agreement; projects on areas of air and water pollution, park management, nature protection, climate change, earthquake prediction, Arctic and Subarctic ecosystems, environment. Funding not specified.

COUNTRY: United Kingdom **SUBJECT:** Environment
EIF DATE: 06/02/86 **TERM DATE:** / /
REMARKS: Five-year self-renewing agreement for the exchange of information regarding management of hazardous wastes and acid deposition. Coordination of positions on international issues. Funding not specified.

National Aeronautics and Space Administration

COUNTRY: Australia **SUBJECT:** Space
EIF DATE: 09/01/87 **TERM DATE:** 09/01/97
REMARKS: Funding is NASA programmatic. Sounding rocket agreement.

COUNTRY: Australia **SUBJECT:** Space Flight Operation
EIF DATE: 05/29/89 **TERM DATE:** 05/02/00
REMARKS: Continuation of a cooperative program facilitating space flight operations. Funding not specified.

COUNTRY: Australia **SUBJECT**: Space and Aeronautics
EIF DATE: 07/21/81 **TERM DATE**: 02/26/90
REMARKS: Funding not specified.

COUNTRY: Australia **SUBJECT**: Atmospheric Science
EIF DATE: 07/24/85 **TERM DATE**: 07/24/90
REMARKS: Funding is NASA programmatic. Long-duration balloon flight program. Flights originate in Australia. A new combined, long duration/short duration agreement is under discussion.

COUNTRY: Australia **SUBJECT**: Atmospheric Science
EIF DATE: 01/13/85 **TERM DATE**: 07/24/90
REMARKS: Funding is NASA programmatic.

COUNTRY: Australia **SUBJECT**: Space
EIF DATE: 01/01/64 **TERM DATE**: 02/26/00
REMARKS: NASA tracking stations in Australia. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Space
EIF DATE: 09/01/89 **TERM DATE**: / /
REMARKS: Global Tropospheric Experiment. Agreement will terminate one year after completion of the final GTE/CITE-3 mission. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Space
EIF DATE: 06/08/90 **TERM DATE**: 06/08/95
REMARKS: Cooperative atmospheric research program using small sounding rockets. Funding not specified.

COUNTRY: Canada **SUBJECT**: Space and Aeronautics
EIF DATE: 09/29/88 **TERM DATE**: / /
REMARKS: Entering Phase C/D of Space Station Program; Detailed Design & Development; total funding for international partners in excess of $7.0 billion, Canadian hardware accounting for over $1 billion.

COUNTRY: Canada **SUBJECT**: Space and Aeronautics
EIF DATE: 07/09/76 **TERM DATE**: / /
REMARKS: Cooperative participation in the development and procurement of a Space Shuttle Attached Remote Manipulator System. Funding not specified.

COUNTRY: Chile **SUBJECT:** Space
EIF DATE: 08/02/85 **TERM DATE:** 08/02/93
REMARKS: Use of Easter Island airport as a Space Shuttle emergency landing. Funding not specified.

COUNTRY: France **SUBJECT:** Space
EIF DATE: 03/23/87 **TERM DATE:** / /
REMARKS: MOU between NASA and the French Centre National d'Etudes Spatiales for Joint Development of TOPEX/POSEIDON ocean project. Termination will occur one year after data collection from spacecraft ceases, or extended by agreement. Funding: NASA Programmatic.

COUNTRY: France **SUBJECT:** Space
EIF DATE: 09/01/84 **TERM DATE:** 09/01/94
REMARKS: Use of Polynesian Island (Hao) as a Space Shuttle emergency landing site. Funding not specified.

COUNTRY: Gambia (The) **SUBJECT:** Space
EIF DATE: 03/01/88 **TERM DATE:** 03/01/98
REMARKS: Use of Gambian air field as a Space Shuttle emergency landing site. Funding not specified.

COUNTRY: Germany **SUBJECT:** Space
EIF DATE: 08/08/82 **TERM DATE:** / /
REMARKS: MOU between NASA and Germany's Federal Minister for Research and Technology on the Roentgensatellit Project (ROSAT). Agreement will continue until terminated with one year's notice. Germany provided the spacecraft and telescope. Funding is NASA programmatic.

COUNTRY: Germany **SUBJECT:** Space
EIF DATE: 10/15/81 **TERM DATE:** / /
REMARKS: MOU between NASA and the Federal Minister for Research and Technology on cooperative participation in the Active Magnetospheric Particle Tracer Explorers (solar physics-winds ions). Expiration with one year's notice. Funding is NASA programmatic.

COUNTRY: Germany **SUBJECT**: Space
EIF DATE: 10/05/77 **TERM DATE**: / /
REMARKS: MOU between NASA and the Federal Minister for Research and Technology of Germany. Agreement continues until terminated with one year's notice. Cooperative participation in Galileo mission to Jupiter. Spacecraft launched 10/89. Funding: NASA programmatic.

COUNTRY: Germany **SUBJECT**: Shuttle Utilization
EIF DATE: 07/10/89 **TERM DATE**: 12/31/99
REMARKS: MOU between NASA and the Federal Ministry of Research and Technology of Germany concerning Space Shuttle flight activities, covering the D-2 mission (1992) and possible future activities to study the effects of microgravity. Funding is NASA programmatic.

COUNTRY: Germany **SUBJECT**: Space
EIF DATE: 10/06/87 **TERM DATE**: / /
REMARKS: MOU between NASA and the Federal Minister for Research and Technology of Germany for cooperative flights of the Spaceborne Imaging Radar (SIR) with the X-Band Synthetic Aperture Radar (X-SAR). Expires one year after final mission. Funding: NASA Programmatic:

COUNTRY: Italy **SUBJECT**: Space
EIF DATE: 02/13/89 **TERM DATE**: / /
REMARKS: MOU between the National Research Council of Italy and NASA for cooperative development and the launch of the Lageos-2/IRIS Space Shuttle mission. Expires one year after completion of joint mission. Funding is NASA programmatic.

COUNTRY: Italy **SUBJECT**: Space
EIF DATE: 03/13/86 **TERM DATE**: / /
REMARKS: MOU between the National Research Council of Italy and NASA for the joint development of a Tethered Satellite System(TSS) for use with the NASA Space Shuttle. Termination will occur one year after completion of joint mission. Funding is NASA programmatic.

COUNTRY: Japan **SUBJECT**: Space
EIF DATE: 09/05/89 **TERM DATE**: / /
REMARKS: Entering Phase C/D of Space Station Program; Detailed Design and Development.Total funding with international partners in excess of $7.0 billion; Japanese hardware accounting for $2 billion.

COUNTRY: Japan **SUBJECT:** Space
EIF DATE: 01/28/88 **TERM DATE:** / /
REMARKS: Direct reception of data from Japan's JERS-1 spacecraft at a NASA receiving station. Agreement in force up to 1 year after technical lifetime of JERS-1. Funding not specified.

COUNTRY: Japan **SUBJECT:** Space and Aeronautics
EIF DATE: 01/24/85 **TERM DATE:** 01/01/90
REMARKS: Use of Japanese airport for Shuttle emergency landing. Funding not specified.

COUNTRY: Morocco **SUBJECT:** Space
EIF DATE: 01/01/87 **TERM DATE:** 01/01/97
REMARKS: Use of Moroccan air base as a Space Shuttle emergency landing site. Funding not specified.

COUNTRY: Multilateral (ESA) **SUBJECT:** STSP (Space Physics)
EIF DATE: 11/30/89 **TERM DATE:** / /
REMARKS: MOU concerning Solar Terrestrial Research Programme; to be extended by mutual agreement. Funding: NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT:** Spacelab
EIF DATE: 01/01/73 **TERM DATE:** 11/28/91
REMARKS: Procurement and use of a space laboratory in conjunction with the space shuttle system. Signed in 1973, Department of State has confirmation records. MOU funded by NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT:** ISEE (Space Physics)
EIF DATE: 03/17/75 **TERM DATE:** / /
REMARKS: International Sun/Earth Explorer program. MOU between ESA and NASA regarding solar terrestrial physics. Expiration is indefinite, as it will continue until terminated with 180 days notice. Funding: NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT:** Space
EIF DATE: 03/29/79 **TERM DATE:** 10/06/95
REMARKS: Ulysses; MOU on cooperative mission to study the poles of the sun between ESA and NASA. Formerly called the International Solar Polar Mission. Expires 5 years after launch (10/06/90). Funding: NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT**: Space
EIF DATE: 10/07/77 **TERM DATE**: 04/24/01
REMARKS: Cooperative participation in the development and use of the Hubble Space Telescope. MOU between ESA and NASA to expire 11 years after launch (4/24/90). Renewal requires consultation one year prior to expiration. Funding: NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT**: Space
EIF DATE: 09/29/88 **TERM DATE**: / /
REMARKS: MOU between ESA, NASA, Canada, Japan on cooperation in the detailed design, development and operation and utilization of the permanently manned civil space station. Total Funding:$7.0 billion for all partners; ESA hardware accounting for $4 billion.

COUNTRY: Multilateral (ESA) **SUBJECT**: Space
EIF DATE: 01/14/86 **TERM DATE**: / /
REMARKS: Agreement for tracking & data reception for the ESA Earth Remote Sensing Satellite (ERS-1) at Fairbanks. Indefinite MOU in force through life of instruments. Renewable for 3 years extension through exchange of letters. Funding: NASA programmatic.

COUNTRY: Multilateral (ESA) **SUBJECT**: IUE (Astronomy)
EIF DATE: 03/21/74 **TERM DATE**: / /
REMARKS: MOU between ESA and NASA on International Ultraviolet Explorer space astronomy mission. Expiration is indefinite, until terminated with 180 days' notice. Funding: NASA programmatic.

COUNTRY: Norway **SUBJECT**: Space
EIF DATE: 07/17/75 **TERM DATE**: / /
REMARKS: Agreement for sounding rocket launches from Andoya, Norway. Funding not specified.

COUNTRY: Senegal **SUBJECT**: Space
EIF DATE: 01/01/83 **TERM DATE**: 01/01/93
REMARKS: Use of Senegalese air field as a Space Shuttle emergency landing site. Funding not specified.

COUNTRY: Senegal **SUBJECT**: Space
EIF DATE: 01/30/81 **TERM DATE**: 12/31/90
REMARKS: NASA tracking station in Senegal being extended for six years. Funding not specified.

COUNTRY: Spain **SUBJECT**: Space
EIF DATE: 01/29/64 **TERM DATE**: 01/29/94
REMARKS: Agreement extended in 10-years' increments. NASA tracking station in Spain. Funding not specified.

COUNTRY: Spain **SUBJECT**: Space
EIF DATE: 05/01/84 **TERM DATE**: 05/01/89
REMARKS: Would have expired, but was extended indefinitely until new agreement is negotiated. Use of Spanish air bases as Space Shuttle emergency landing sites. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Space
EIF DATE: 08/28/73 **TERM DATE**: / /
REMARKS: Agreement for sounding rocket launches from Esrange, Sweden. Funding not specified.

COUNTRY: USSR **SUBJECT**: Space
EIF DATE: 04/15/87 **TERM DATE**: 04/14/92
REMARKS: Cooperation in 5 areas of space science and applications: space biology and medicine; solar system exploration; astronomy and astrophysics; solar terrestrial physics; and earth sciences. Funding not specified.

COUNTRY: USSR **SUBJECT**: Space
EIF DATE: 07/25/90 **TERM DATE**: / /
REMARKS: A U.S. Total Ozone Mapping Spectrometer (TOMS), including an Interface Adapter Module, will be launched on a Soviet Meteor-3 satellite in August, 1991. Funding not specified.

National Science Foundation

COUNTRY: Argentina **SUBJECT**: Environment
EIF DATE: 06/19/89 **TERM DATE**: 06/19/91
REMARKS: Ozone in upper atmosphere study. Funding not specified.

COUNTRY: Argentina **SUBJECT**: Basic Sciences
EIF DATE: 08/01/72 **TERM DATE**: 08/01/92
REMARKS: Supports collaborative research, workshops, and short-term planning visits. Funding not specified.

COUNTRY: Australia **SUBJECT**: Basic Sciences
EIF DATE: 10/01/68 **TERM DATE**: 11/01/90
REMARKS: Funding not specified.

COUNTRY: Austria **SUBJECT**: Basic Sciences
EIF DATE: 02/28/89 **TERM DATE**: 02/27/94
REMARKS: Joint research; joint S&T education projects; visits; exchange of personnel and information; meeting, seminar, and workshop support. Previous agreement: 1984-1989. Funding not specified.

COUNTRY: Belgium **SUBJECT**: Basic Sciences
EIF DATE: 06/02/85 **TERM DATE**: 06/01/90
REMARKS: Activities include scientific exchanges and fellowships, joint seminars and workshops, joint research, and staff exchanges. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Basic Sciences
EIF DATE: 03/06/84 **TERM DATE**: 05/01/91
REMARKS: S&T initiative signed by Presidents Sarney and Reagan; NSF has a lead role in basic sciences and engineering, and approx $600,000 has been designated for NSF, $300,000 for basic sciences; the rest for engineering.

COUNTRY: Brazil **SUBJECT**: Basic Sciences
EIF DATE: 04/13/84 **TERM DATE**: 05/01/91
REMARKS: Projects under S&T umbrella agreement; information and personnel exchanges; joint research; seminars, workshops, and meetings. Funding not specified.

COUNTRY: Bulgaria **SUBJECT**: Basic Sciences
EIF DATE: 02/09/78 **TERM DATE**: 02/09/93
REMARKS: Joint research, seminars and workshops; and short term project development visits. Funding not specified.

COUNTRY: China **SUBJECT**: Earth Sciences
EIF DATE: 01/24/80 **TERM DATE**: 04/30/91
REMARKS: Protocol under S&T umbrella agreement; joint program with USGS. Funding not specified.

COUNTRY: China **SUBJECT**: Basic Sciences
EIF DATE: 12/10/80 **TERM DATE**: 12/09/90
REMARKS: Protocol under extended S&T umbrella agreement; basic and applied sciences, energy, and social sciences. Funding not specified. May be continued with S&T umbrella agreement.

COUNTRY: Czechoslovakia **SUBJECT:** Basic Sciences
EIF DATE: 06/27/88 **TERM DATE:** 06/27/91
REMARKS: Basic framework of cooperation, activities to include cooperative research projects, joint seminars and workshops, and individual scientific visits. Funding not specified.

COUNTRY: Finland **SUBJECT:** Basic Sciences
EIF DATE: 04/07/86 **TERM DATE:** 04/07/91
REMARKS: Projects under the umbrella S&T agreement; prior MOU existed from 8/80-8/85; visits; personnel and staff exchanges; fellowships; joint research, seminars, and workshops. Funding not specified.

COUNTRY: France **SUBJECT:** Basic Sciences
EIF DATE: 01/01/70 **TERM DATE:** 05/02/88
REMARKS: MOU for joint research and workshops. Continuing even though officially held up by IPR language. Funding not specified.

COUNTRY: Hungary **SUBJECT:** Basic Sciences
EIF DATE: 07/07/82 **TERM DATE:** 07/07/92
REMARKS: Joint research, seminars, and workshops; covers all aspects of basic and applied natural and engineering sciences, social sciences, and math. An earlier generation of this agreement (NSF/KKI July 1972) predated the umbrella. Funding not specified.

COUNTRY: Israel **SUBJECT:** Basic Sciences
EIF DATE: 05/28/85 **TERM DATE:** 05/28/90
REMARKS: MOU signed by NCRD/NSF 5/85 for personnel and information exchanges in basic and applied sciences; program presently is supporting annual workshops on subject of mutual interest to science community. Further extension under review. Funding not specified.

COUNTRY: Italy **SUBJECT:** Basic Sciences
EIF DATE: 06/19/67 **TERM DATE:** 04/01/93
REMARKS: Projects under S&T umbrella agreement; provides for joint research, seminars and workshops; information and personnel exchanges. NSF counterpart is the Italian National Research Council. Dept. of State and Italian Foreign Ministry-lead agencies. Funding not specified.

Appendix II: National Science Foundation

COUNTRY: Japan **SUBJECT:** Computer Science
EIF DATE: 04/01/87 **TERM DATE:** / /
REMARKS: Ongoing. Establishes exchange program. Funding: variable, $70,000 to date.

COUNTRY: Japan **SUBJECT:** Basic Sciences
EIF DATE: 06/01/88 **TERM DATE:** 06/01/93
REMARKS: Seminars and workshops; long-term joint research visions; short-term project development visits; annual seminars identify joint priorities. IPR under investigation. Funding not specified.

COUNTRY: Japan **SUBJECT:** Basic Sciences
EIF DATE: 06/01/63 **TERM DATE:** 06/01/93
REMARKS: Seminars and workshops; long-term joint research visits; short-term project development visits; annual seminars identify joint priorities. Funding not specified. Renewal automatic unless parties refuse.

COUNTRY: Japan **SUBJECT:** Computer Science
EIF DATE: 06/01/86 **TERM DATE:** / /
REMARKS: MOU with the Japanese Institute for new generation computer technology (ICOT). Establishes exchange program where NSF pays for up to 3 researchers per year.

COUNTRY: Japan **SUBJECT:** Basic Science
EIF DATE: 06/01/88 **TERM DATE:** / /
REMARKS: MOU with the Agency of Industrial Science and Technology (AIST) to send up to 30 researchers per year to AIST labs for 6-12 month stays. Renewable every 5 years if both parties concur. Funding not specified.

COUNTRY: Japan **SUBJECT:** Energy
EIF DATE: 10/05/81 **TERM DATE:** / /
REMARKS: Renewed Feb, 1990. Umbrella energy agreement, includes a protocol on photosynthesis and photoconversion research which NSF administers, and DOE co-implements. Funding not specified.

COUNTRY: Korea **SUBJECT:** Basic Sciences
EIF DATE: 05/24/87 **TERM DATE:** 05/24/92
REMARKS: NSF-KOSEF MOU under S&T umbrella; joint research, seminars, and workshops; long-term joint research visits; short-term project development visits; annual seminars identify joint priorities. IPR under negotiation. Funding not specified.

COUNTRY: Korea **SUBJECT:** Basic Sci. and Eng.
EIF DATE: 05/24/77 **TERM DATE:** 05/24/92
REMARKS: MOU renewed'82,'87. Renewable every 5 years. When S&T umbrella agreement is renegotiated and signed, MOU under IPR protection. Joint research, seminars, and workshops; long-term joint research visits; short-term project development. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Basic Sciences
EIF DATE: 06/15/72 **TERM DATE:** / /
REMARKS: Ongoing. Projects under S&T umbrella agreement; information and personnel exchanges; joint research; seminars, workshops, and meetings. Dept. of State and Mexican Foreign Ministry are lead agencies. Funding not specified.

COUNTRY: New Zealand **SUBJECT:** Basic Sciences
EIF DATE: 02/01/74 **TERM DATE:** 02/01/91
REMARKS: Projects under S&T umbrella agreement; joint research; information and personnel exchanges; utilization of installations. IPR under negotiation; NSF counterpart is Ministry of Science, Research and Technology (MORST). Funding not specified.

COUNTRY: New Zealand **SUBJECT:** Basic Sciences
EIF DATE: 07/01/88 **TERM DATE:** 06/30/92
REMARKS: Projects under S&T umbrella agreement; joint research; information and personnel exchanges; utilization of installation. Funding not specified.

COUNTRY: Pakistan **SUBJECT:** Basic Science
EIF DATE: 03/02/81 **TERM DATE:** 05/31/89
REMARKS: Cooperative Science Program MOU with the Pakistan Ministry of Science and Technology;joint research,seminars and workshops;visits;supports attendance at international meetings; information and data exchanges; translation services.Pending renewal. Funding not specified.

COUNTRY: Poland **SUBJECT:** Basic Sciences
EIF DATE: 06/13/88 **TERM DATE:** 06/13/93
REMARKS: MOU under the 1987 S&T umbrella agreement provides for joint research projects, seminars and workshops, and short-term project development visits. Funding not specified.

COUNTRY: Romania **SUBJECT**: Basic Sciences
EIF DATE: 02/27/79 **TERM DATE**: 02/27/88
REMARKS: Joint workshops and seminars; short-term project development visits; joint research. Renewal pending. Funding not specified.

COUNTRY: Saudi Arabia **SUBJECT**: Basic Sciences
EIF DATE: 06/01/79 **TERM DATE**: 02/13/90
REMARKS: Umbrella project agreement in conjunction with US Treasury Dept.; institutional development; development of a national S&T information system, grants program and a national research institute; science education. An exchange of letters have occured. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Basic Sciences
EIF DATE: 10/20/84 **TERM DATE**: 10/20/89
REMARKS: Letter of Agreement for joint research, seminars, workshops and scientific exchanges with the National Science Research Council of Sweden. Consideration of renewal under process. Funding not specified.

Nuclear Regulatory Agency

COUNTRY: Austria **SUBJECT**: Nuclear Safety
EIF DATE: 11/27/89 **TERM DATE**: 11/27/94
REMARKS: Source Term Research and Application with OEFZS. Funding not specified.

COUNTRY: Belgium **SUBJECT**: Nuclear Safety
EIF DATE: 02/01/83 **TERM DATE**: / /
REMARKS: Severe accident research with BNL and CEN/SCK. Funding not specified.

COUNTRY: Belgium **SUBJECT**: Nuclear Safety
EIF DATE: 06/06/78 **TERM DATE**: 05/02/93
REMARKS: Information exchange and general technical cooperation with Belgian Government. Funding not specified.

COUNTRY: Brazil **SUBJECT**: Nuclear Safety
EIF DATE: 05/20/76 **TERM DATE**: 05/18/94
REMARKS: Information exchange and general technical cooperation with CNEN. Funding not specified.

Appendix II: Nuclear Regulatory Agency

COUNTRY: Canada **SUBJECT:** Nuclear Safety
EIF DATE: 05/20/87 **TERM DATE:** / /
REMARKS: International piping integrity research. Funding not specified.

COUNTRY: Canada **SUBJECT:** Nuclear Safety
EIF DATE: 02/10/84 **TERM DATE:** 10/15/91
REMARKS: Severe accident research with AECL. Funding not specified.

COUNTRY: Canada **SUBJECT:** Nuclear Safety
EIF DATE: 06/21/89 **TERM DATE:** 06/21/94
REMARKS: Information exchange and general technical cooperation with AECB. Funding not specified.

COUNTRY: China **SUBJECT:** Nuclear Safety
EIF DATE: 10/17/81 **TERM DATE:** 10/17/91
REMARKS: Information exchange, and general technical cooperation with NNSA; protocol. Funding not specified.

COUNTRY: Czechoslovakia **SUBJECT:** Nuclear Safety
EIF DATE: 04/14/89 **TERM DATE:** 04/14/94
REMARKS: Information exchange and general technical cooperation with AEC. Funding not specified.

COUNTRY: Denmark **SUBJECT:** Nuclear Safety
EIF DATE: 10/03/75 **TERM DATE:** 09/29/85
REMARKS: Information exchange, and general technical cooperation. Renewal being negotiated. Funding not specified.

COUNTRY: Egypt **SUBJECT:** Nuclear Safety
EIF DATE: 06/08/81 **TERM DATE:** 06/08/86
REMARKS: Information exchange and general technical cooperation with NEA; extension being renegotiated. Funding not specified.

COUNTRY: Finland **SUBJECT:** Nuclear Safety
EIF DATE: 04/26/89 **TERM DATE:** 04/26/93
REMARKS: Participation in Severe Accident Research Program with STUK and VTT. Effective upon signature of parties. Funding not specified.

COUNTRY: Finland **SUBJECT:** Nuclear Safety
EIF DATE: 09/26/80 **TERM DATE:** 07/09/95
REMARKS: Information exchange and general technical cooperation with STUK. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Energy
EIF DATE: 06/28/74 **TERM DATE:** 09/17/89
REMARKS: Information exchange and general technical cooperation with MIAT. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 05/05/87 **TERM DATE:** / /
REMARKS: International piping integrity research with CEA. To last for the duration of IPRG Program. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 12/31/86 **TERM DATE:** 12/31/91
REMARKS: Light water reactor safety research umbrella agreement with CEA. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 08/20/85 **TERM DATE:** 08/20/92
REMARKS: Study of Seismically Induced Strong Ground Motion at Shallow Soil Sites. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 06/15/84 **TERM DATE:** / /
REMARKS: Termination date:open-ended. Provides for classified safety information exchange with the MIAT. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 09/16/86 **TERM DATE:** 09/16/91
REMARKS: Thermal hydraulic research with CEA. Funding not specified.

COUNTRY: France **SUBJECT:** Nuclear Safety
EIF DATE: 07/25/88 **TERM DATE:** 07/24/94
REMARKS: Assessment of Long Term Cable Aging Degradation with CEA. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 04/30/81 **TERM DATE:** 04/30/91
REMARKS: Reactor safety research program; umbrella agreement with BMFT. Funding not specified.

Appendix II: Nuclear Regulatory Agency

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/85 **TERM DATE:** 06/30/87
REMARKS: Gundremmingen KRB-A reactor pressure vessel. Expired: New agreement under negotiation. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 03/13/90 **TERM DATE:** 12/31/90
REMARKS: Cooperation to further develop the LMR Version of the CONTAIN Code with KfK. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 07/06/81 **TERM DATE:** / /
REMARKS: Termination date:open-ended. Provides for classified safety information exchange with the BMU. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 10/01/75 **TERM DATE:** 07/17/91
REMARKS: Information exchange and general technical cooperation with BMU. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 02/06/85 **TERM DATE:** 02/06/90
REMARKS: Thermal hydraulic research, with BMFT; extension under discussion. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: / / **TERM DATE:** / /
REMARKS: Severe accident research with KFK. New agreement under negotiation. Funding not specified.

COUNTRY: Germany **SUBJECT:** Nuclear Safety
EIF DATE: 08/30/88 **TERM DATE:** 07/17/91
REMARKS: Accident Management Research under BMU Arrangement. Funding not specified.

COUNTRY: Greece **SUBJECT:** Nuclear Safety
EIF DATE: 10/18/78 **TERM DATE:** 10/17/88
REMARKS: Information exchange and general technical cooperation; renewal awaiting signature. Funding not specified.

COUNTRY: Israel **SUBJECT:** Nuclear Safety
EIF DATE: 05/19/78 **TERM DATE:** 07/11/93
REMARKS: Information exchange and general technical cooperation with AEC. Funding not specified.

COUNTRY: Italy **SUBJECT:** Nuclear Safety
EIF DATE: 04/03/89 **TERM DATE:** 04/03/93
REMARKS: International piping integrity research with ENEA. Funding not specified.

COUNTRY: Italy **SUBJECT:** Nuclear Safety
EIF DATE: 01/23/86 **TERM DATE:** 01/23/91
REMARKS: Thermal hydraulic research with ENEA. Funding not specified.

COUNTRY: Italy **SUBJECT:** Nuclear Safety
EIF DATE: 12/23/82 **TERM DATE:** 06/05/91
REMARKS: Severe accident, source term, and containment research with ENEA. Funding not specified.

COUNTRY: Italy **SUBJECT:** Nuclear Safety
EIF DATE: 05/29/75 **TERM DATE:** 09/28/93
REMARKS: Information exchange and general technical cooperation with ENEA. Funding not specified.

COUNTRY: Italy **SUBJECT:** Nuclear Safety
EIF DATE: 12/22/88 **TERM DATE:** 09/30/93
REMARKS: Safety and Licensing of Future Nuclear Power Plants with ENEA. Funding not specified.

COUNTRY: Japan **SUBJECT:** Nuclear Safety
EIF DATE: 05/30/74 **TERM DATE:** 12/31/90
REMARKS: Information exchange with STA and ANRE, and general technical cooperation. Funding not specified.

COUNTRY: Japan **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/84 **TERM DATE:** 01/31/92
REMARKS: ROSA IV LWR safety research agreement on small break LOCAs and transients. Funding not specified.

COUNTRY: Japan **SUBJECT:** Nuclear Safety
EIF DATE: 11/07/84 **TERM DATE:** 11/06/89
REMARKS: Radioactive waste management. Expired: New agreement under discussion. Funding not specified.

COUNTRY: Japan **SUBJECT:** Nuclear Safety
EIF DATE: 09/13/83 **TERM DATE:** 12/31/90
REMARKS: Severe fuel damage & fission product source term research with JAERI. Funding not specified.

COUNTRY: Japan **SUBJECT:** Nuclear Safety
EIF DATE: 10/09/87 **TERM DATE:** 10/08/92
REMARKS: Development and Application of Nuclear Safety Analysis Computer Codes with ANRE/JINS. Funding not specified.

COUNTRY: Korea **SUBJECT:** Nuclear Safety
EIF DATE: 03/18/76 **TERM DATE:** 11/10/86
REMARKS: Information exchange and general technical cooperation with MOST; renewal under negotiation. Funding not specified.

COUNTRY: Korea **SUBJECT:** Nuclear Safety
EIF DATE: 08/23/84 **TERM DATE:** 12/27/90
REMARKS: Severe accident, source term, and containment research with KAER I. Funding not specified.

COUNTRY: Korea **SUBJECT:** Nuclear Safety
EIF DATE: 05/01/86 **TERM DATE:** 05/01/91
REMARKS: Thermal hydraulic research with KAER I. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Nuclear Safety
EIF DATE: 04/08/81 **TERM DATE:** 10/06/94
REMARKS: Information exchange and technical cooperation with CNSNS. Funding not specified.

COUNTRY: Mexico **SUBJECT:** Nuclear Safety
EIF DATE: 06/02/87 **TERM DATE:** 06/02/92
REMARKS: General safety research umbrella agreement with CNSNS. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Nuclear Safety
EIF DATE: 01/01/85 **TERM DATE:** 12/31/90
REMARKS: OECD Halden Reactor project. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Nuclear Safety
EIF DATE: 01/31/89 **TERM DATE:** 09/30/91
REMARKS: OECD Project to investigate the Three Mile Island 2 Reactor Pressure Vessel. Funding not specified.

COUNTRY: Multilateral **SUBJECT:** Nuclear Safety
EIF DATE: 09/30/88 **TERM DATE:** 09/29/90
REMARKS: 2D/3D Agreement. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Nuclear Safety
EIF DATE: 09/01/87 **TERM DATE**: 09/01/90
REMARKS: OECD Project on the International Alligator Rivers Analogue. Funding not specified.

COUNTRY: Multilateral **SUBJECT**: Nuclear Safety
EIF DATE: 03/19/79 **TERM DATE**: 09/20/89
REMARKS: EURATOM; nuclear safety research. Expired: Extension under discussion. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Nuclear Safety
EIF DATE: 09/01/87 **TERM DATE**: 08/31/91
REMARKS: Nuclear Reactor Safety Research with ECN. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Nuclear Safety
EIF DATE: 10/03/77 **TERM DATE**: 09/23/92
REMARKS: Information exchange and general technical cooperation with NMSAE. Funding not specified.

COUNTRY: Philippines **SUBJECT**: Nuclear Safety
EIF DATE: 04/28/80 **TERM DATE**: 06/18/90
REMARKS: Information exchange and general technical cooperation with AEC; Expired, and renewal being renegotiated. Funding not specified.

COUNTRY: Spain **SUBJECT**: Nuclear Safety
EIF DATE: 10/29/74 **TERM DATE**: 10/04/94
REMARKS: Information exchange and general technical cooperation with CNS. Funding not specified.

COUNTRY: Spain **SUBJECT**: Nuclear Safety
EIF DATE: 11/15/85 **TERM DATE**: 11/15/90
REMARKS: a RES agreement. Funding not specified.

COUNTRY: Sweden **SUBJECT**: Nuclear Safety
EIF DATE: 10/01/84 **TERM DATE**: 12/31/90
REMARKS: Severe accident research, source term, and containment research with SKI/Studsvik. Funding not specified.

COUNTRY: Sweden **SUBJECT:** Nuclear Safety
EIF DATE: 03/03/87 **TERM DATE:** / /
REMARKS: International piping integrity research with SKI/Studsvik. To last the duration of IPRE Program. Funding not specified.

COUNTRY: Sweden **SUBJECT:** Nuclear Safety
EIF DATE: 02/01/89 **TERM DATE:** 01/31/99
REMARKS: Studsvik Trans-Ramp IV Project. Funding not specified.

COUNTRY: Sweden **SUBJECT:** Nuclear Safety
EIF DATE: 06/06/74 **TERM DATE:** 10/04/94
REMARKS: Information exchange and general technical cooperation with SKI. Funding not specified.

COUNTRY: Sweden **SUBJECT:** Nuclear Safety
EIF DATE: 02/25/85 **TERM DATE:** 02/25/88
REMARKS: Thermal hydraulics. Expired: New agreement under negotiation. Funding not specified.

COUNTRY: Switzerland **SUBJECT:** Nuclear Safety
EIF DATE: 07/25/89 **TERM DATE:** 12/31/91
REMARKS: Thermal-Hydraulic Research with Paul Scherrer Institute (PSI). Funding not specified.

COUNTRY: Switzerland **SUBJECT:** Nuclear Safety
EIF DATE: 06/09/87 **TERM DATE:** 06/09/91
REMARKS: Severe accident research with FOE; extension under discussion. Funding not specified.

COUNTRY: Switzerland **SUBJECT:** Nuclear Safety
EIF DATE: 03/01/87 **TERM DATE:** 07/31/91
REMARKS: International piping integrity research. Funding not specified.

COUNTRY: Switzerland **SUBJECT:** Nuclear Safety
EIF DATE: / / **TERM DATE:** / /
REMARKS: Thermal hydraulic transients and ECCS REFLOOD program; extension being negotiated. Funding not specified.

COUNTRY: Switzerland **SUBJECT:** Nuclear Safety
EIF DATE: 09/26/86 **TERM DATE:** 09/26/91
REMARKS: Radioactive waste management and safety research with NAGRA. Funding not specified.

COUNTRY: Switzerland **SUBJECT**: Nuclear Safety
EIF DATE: 12/09/74 **TERM DATE**: 09/23/92
REMARKS: Information exchange and general technical cooperation with FOE. Funding not specified.

COUNTRY: Taiwan **SUBJECT**: Nuclear Safety
EIF DATE: 10/12/84 **TERM DATE**: 10/22/90
REMARKS: Participation in Severe Nuclear Accident Research Program with CCNAA/AIT. Funding not specified.

COUNTRY: Taiwan **SUBJECT**: Nuclear Safety
EIF DATE: 05/01/86 **TERM DATE**: 05/31/90
REMARKS: Thermal-Hydraulic Research between AIT and the CCNAA. Funding not specified.

COUNTRY: Taiwan **SUBJECT**: Nuclear Safety
EIF DATE: 06/26/87 **TERM DATE**: 06/25/90
REMARKS: Plant Analyzer Development between CCNAA and the AIT. Funding not specified.

COUNTRY: Taiwan **SUBJECT**: Nuclear Safety
EIF DATE: 04/23/87 **TERM DATE**: 07/31/91
REMARKS: Participation in the International Piping Integrity Research Group with CCNAA/AIT. Funding not specified.

COUNTRY: USSR **SUBJECT**: Nuclear Safety
EIF DATE: 04/26/88 **TERM DATE**: 04/26/93
REMARKS: Information exchange and general technical cooperation with SCUAE; Memorandum of Cooperation. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 09/30/83 **TERM DATE**: 01/24/92
REMARKS: Severe accident research with AEA. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 02/12/85 **TERM DATE**: 12/31/91
REMARKS: Nuclear safety research with AEA; modelling of LOCA's. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 01/28/88 **TERM DATE**: 01/28/92
REMARKS: Severe accident research agreement with UKAEA. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 10/01/88 **TERM DATE**: 09/30/90
REMARKS: Implementing agreement relating to USNRC participation in the UKAEA program. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 07/11/89 **TERM DATE**: 09/30/92
REMARKS: Reliability and Probabilistic Risk Analysis with UKAEA. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 03/13/75 **TERM DATE**: 04/07/91
REMARKS: Information exchange and general technical cooperation with H&SE. Funding not specified.

COUNTRY: United Kingdom **SUBJECT**: Nuclear Safety
EIF DATE: 08/03/77 **TERM DATE**: 08/03/92
REMARKS: General safety research umbrella agreement with AEA. Funding not specified.

COUNTRY: Yugoslavia **SUBJECT**: Nuclear Safety
EIF DATE: 09/19/85 **TERM DATE**: 09/19/90
REMARKS: Information exchange and general technical cooperation with FSEI; Expired, but renewal being renegotiated. Funding not specified.

U.S. Department of Agriculture

COUNTRY: Argentina **SUBJECT**: Agricultural Science
EIF DATE: 05/20/81 **TERM DATE**: 11/17/91
REMARKS: Program of mutual benefit in agricultural technology, animal health (foot-and-mouth disease), plant health, pest control, agricultural economies, forestry and soil conservation. Funding not specified.

COUNTRY: Australia **SUBJECT**: Agricultural Science
EIF DATE: 02/22/82 **TERM DATE**: / /
REMARKS: Agricultural R&D; soil and water conservation, industrial utilization. Funding not specified.

Appendix II: U.S. Department of Agriculture

COUNTRY: Bulgaria **SUBJECT:** Agricultural Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: A previous Joint Statement between the USDA and Bulgaria expired at the end of 1984. The only substantive changes in the proposed Joint Statement are Article IV on the protection of IPR and an annex covering this issue in detail. Funding not specified.

COUNTRY: China **SUBJECT:** Agricultural Science
EIF DATE: 01/31/79 **TERM DATE:** / /
REMARKS: Agricultural R&D under umbrella S&T agreement;exchange of germplasm like alfalfa, soybeans, pecans; disease resistance breeding in cotton,tomato,cabbage. Other participating agencies-Chinese Ministries of Forestry, Commerce, Water Conservancy. Funding not specified.

COUNTRY: EC **SUBJECT:** Remote Sensing
EIF DATE: / / **TERM DATE:** / /
REMARKS: Remote sensing applications to agriculture and forestry. Unsigned, under negotiations. Funding not specified.

COUNTRY: France **SUBJECT:** Agricultural Science
EIF DATE: 03/15/82 **TERM DATE:** 03/04/92
REMARKS: Agricultural S&T; forestry, comparison of remote sensing data for agricultural use, plant science, bioprocessing, economics, etc. Funding not specified.

COUNTRY: Germany **SUBJECT:** Agricultural Science
EIF DATE: 06/01/81 **TERM DATE:** 06/01/91
REMARKS: Agricultural S&T; plant biotechnology, integrated pest management, reproductive biology of swine, etc. Funding not specified.

COUNTRY: Greece **SUBJECT:** Agricultural Science
EIF DATE: 06/29/81 **TERM DATE:** 06/29/91
REMARKS: Germplasm exchange (Agricultural S&T). Currently in abeyance - no activities planned. No funding information available.

COUNTRY: Ireland **SUBJECT:** Agricultural Science
EIF DATE: / / **TERM DATE:** / /
REMARKS: Agricultural S&T, forage/livestock management, extension, food technology, agribusiness promotion. Unsigned, under negotiations. Funding not specified.

COUNTRY: Mexico **SUBJECT**: Agricultural Science
EIF DATE: 12/06/83 **TERM DATE**: 12/06/88
REMARKS: Joint Communique, 04/28/88 to pursue renewal for program of agricultural and natural resource cooperation in the fields of tropical agriculture, agriculture in arid zones, animal husbandry, soil conservation, crop forecasting, pest control. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Agricultural Science
EIF DATE: 11/20/80 **TERM DATE**: 11/20/90
REMARKS: Agricultural S&T; plant physiology, economic research; soil and water science; integrated pest management, etc. Funding not specified.

COUNTRY: Netherlands **SUBJECT**: Agricultural Science
EIF DATE: 11/20/85 **TERM DATE**: 11/20/90
REMARKS: Agricultural S&T; plant physiology, economic research; soil and water science; integrated pest management, etc. Funding not specified.

COUNTRY: New Zealand **SUBJECT**: Agricultural Science
EIF DATE: 11/29/83 **TERM DATE**: 11/29/88
REMARKS: Agricultural R&D; tree improvement; animal diseases surveillance systems. Renewal pending IPR approval. Funding not specified.

COUNTRY: Philippines **SUBJECT**: Agricultural Science
EIF DATE: 02/10/88 **TERM DATE**: 02/10/93
REMARKS: Agricultural S&T; cocoa production technology. Funding not specified.

COUNTRY: Romania **SUBJECT**: Agricultural Science
EIF DATE: / / **TERM DATE**: / /
REMARKS: Funding not specified.

COUNTRY: Thailand **SUBJECT**: Agricultural Science
EIF DATE: 09/19/84 **TERM DATE**: 09/19/89
REMARKS: Agricultural development; human nutrition; soil conservation techniques; post-harvest techniques for tropical fruits and vegetables. Funding not specified.

COUNTRY: Turkey **SUBJECT:** Agricultural Science
EIF DATE: 11/01/85 **TERM DATE:** 04/01/90
REMARKS: Agricultural S&T; joint activities FY 1988 included the First World Walnut Conference; few activities planned. Funding not specified.

COUNTRY: USSR **SUBJECT:** Agriculture
EIF DATE: 07/01/73 **TERM DATE:** / /
REMARKS: 9th session of Joint Committee on Cooperation in Agriculture approved Protocols of agri R&D , agri econ, food processing & forestry working groups. Agreed to exchange teams of scientists & specialists in 1990 &1991. Funding not specified.

COUNTRY: Venezuela **SUBJECT:** Agricultural Science
EIF DATE: 07/01/83 **TERM DATE:** 07/01/88
REMARKS: Funding not specified.

U.S. Government: Umbrella Agreements

COUNTRY: Argentina **SUBJECT:** S&T Cooperation
EIF DATE: 08/11/72 **TERM DATE:** 08/11/92
REMARKS: Funding not specified.

COUNTRY: Brazil **SUBJECT:** S&T Umbrella
EIF DATE: 12/01/71 **TERM DATE:** 04/01/90
REMARKS: Agreement was funded by the Presidential S&T initiative ($2 million from U.S. and $2 million from Brazil); State Dept. is executive agent. Additional funding not specified. Projects in engineering, agriculture, basic science, energy, and environment.

COUNTRY: China **SUBJECT:** S&T Umbrella
EIF DATE: 01/31/79 **TERM DATE:** 04/30/90
REMARKS: Original umbrella agreement left IPR considerations to the individual MOUs under the umbrella. Currently operating under extension. Funding not specified.

COUNTRY: EC **SUBJECT:** Environment
EIF DATE: 06/04/74 **TERM DATE:** / /
REMARKS: Letters establishing the framework for cooperative environmental activity. Initial areas of interest include exchange of information on methods of analysis and measurement of certain air and water pollutants. Funding not specified.

COUNTRY: EC **SUBJECT**: Energy
EIF DATE: 11/08/58 **TERM DATE**: 12/31/95
REMARKS: The Agreement for Cooperation between the Government of the United States of America and the European Atomic Energy Community concerning Peaceful Uses of Atomic Energy.

COUNTRY: Egypt **SUBJECT**: S&T Umbrella
EIF DATE: 11/09/86 **TERM DATE**: 11/09/91
REMARKS: Agreement relating to cooperation in the areas of science and technology. Funding not specified.

COUNTRY: Finland **SUBJECT**: S&T Umbrella
EIF DATE: 09/15/85 **TERM DATE**: 09/15/90
REMARKS: Agreement on cooperation in S&T; agreement contains an Intellectual Property Annex for protection of copyrights, patents, other intellectual property; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: India **SUBJECT**: S&T Initiative
EIF DATE: 01/31/83 **TERM DATE**: / /
REMARKS: Agreement by President Reagan and Prime Minister Gandhi to launch the Science and Technology Initiative (STI) on 7/28/82; initiative implemented Oct. 83; renewed for 3 years in Oct. 85 and Oct. 88. Agreement covers the fields of health, agriculture, monsoons, solid-state science and engineering, and the SSC. Funding not specified.

COUNTRY: Indonesia **SUBJECT**: S&T Umbrella
EIF DATE: 10/01/79 **TERM DATE**: 10/05/89
REMARKS: Agreement on cooperation in scientific research and technological development; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: Israel **SUBJECT**: S&T Umbrella
EIF DATE: 10/25/77 **TERM DATE**: / /
REMARKS: Funding not specified.

COUNTRY: Italy **SUBJECT**: S&T Umbrella
EIF DATE: 04/01/88 **TERM DATE**: 04/01/93
REMARKS: Agreement for scientific and technological cooperation; agreement contains intellectual property provisions; individual cooperating agencies negotiate funding with counterpart agencies.

Appendix II: U.S. Government: Umbrella Agreements

COUNTRY: Japan **SUBJECT**: S&T Umbrella
EIF DATE: 06/20/88 **TERM DATE**: 06/20/93
REMARKS: Agreement on cooperation and development in science and technology; joint R&D in all areas of S&T, except energy, and cooperation in developing S&T policies of the two countries; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: Japan **SUBJECT**: S&T Umbrella
EIF DATE: 01/01/75 **TERM DATE**: 01/01/91
REMARKS: '75 bilateral environmental agreement and '88 umbrella S&T agreement (UJST) offers cooperation in facilitating transfer of Japan technology, statistics, analytical techniques. 14 panels operate under '75 agreement, Japan proposed another for global atmosphere. Funding not specified.

COUNTRY: Korea **SUBJECT**: S&T Umbrella
EIF DATE: 11/22/76 **TERM DATE**: 10/01/88
REMARKS: Agreement relating to scientific and technical cooperation; negotiations currently underway on renewal of the agreement; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: Mexico **SUBJECT**: S&T Umbrella
EIF DATE: 06/15/72 **TERM DATE**: / /
REMARKS: Agreement for scientific and technical cooperation; individual cooperating agencies negotiate funding with counterpart agencies; restructuring of bilateral mixed commission in 1988 to deal with policy and coordination issues only.

COUNTRY: New Zealand **SUBJECT**: S&T Umbrella
EIF DATE: 02/27/74 **TERM DATE**: 08/27/89
REMARKS: Agreement for scientific and technological cooperation; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: Pakistan **SUBJECT**: S&T Umbrella
EIF DATE: 12/06/82 **TERM DATE**: / /
REMARKS: Agreement to establish a Joint Commission on Economic, Commercial, Scientific, Technological, Educational and Cultural Cooperation. Funding not specified.

Appendix II: U.S. Government: Umbrella Agreements

COUNTRY: Poland **SUBJECT**: S&T Umbrella
EIF DATE: 09/28/87 **TERM DATE**: 09/28/92
REMARKS: Agreement established a joint commission and a joint fund with contributions from both sides after lapse of an earlier agreement signed in 1972; extensive language on protection of intellectual property. Funding not specified.

COUNTRY: Senegal **SUBJECT**: S&T Umbrella
EIF DATE: 08/17/82 **TERM DATE**: 08/01/87
REMARKS: Agreement for scientific and technological cooperation. Funding not specified.

COUNTRY: Spain **SUBJECT**: S&T Umbrella
EIF DATE: 05/01/84 **TERM DATE**: 05/01/88
REMARKS: The US-Spain Agreement of Friendship, Defense and Cooperation under which a Complementary Agreement on Culture and Education and Science and Technology functions, expired May 1988; rights and obligations continue for 1 year. Funds not specified.

COUNTRY: Sri Lanka **SUBJECT**: S&T Umbrella
EIF DATE: 06/01/84 **TERM DATE**: 06/01/90
REMARKS: Agreement on cooperation in science and technology. Funding not specified.

COUNTRY: Thailand **SUBJECT**: S&T Umbrella
EIF DATE: 04/13/84 **TERM DATE**: 10/13/89
REMARKS: Agreement on cooperation in science and technology; individual cooperating agencies negotiate funding with counterpart agencies.

COUNTRY: USSR **SUBJECT**: S&T Umbrella
EIF DATE: 01/08/89 **TERM DATE**: 01/08/94
REMARKS: Provides for cooperation in basic scientific research in eight areas. Includes two subsidiary memoranda of understanding. Funding not specified.

COUNTRY: Venezuela **SUBJECT**: S&T Umbrella
EIF DATE: 07/01/83 **TERM DATE**: 07/01/88
REMARKS: Funding not specified.

COUNTRY: Yugoslavia **SUBJECT:** S&T Umbrella

EIF DATE: 10/25/88 **TERM DATE:** 10/25/93

REMARKS: Supersedes and terminates the previous umbrella signed on 04-02-80, US participating agencies include: DOE, EPA, HHS, NIST, NSF, USDA, USGS, Bureau of Mines, and others subject to funding. US contributions: $10 million over 5 years.

Glossary of Abbreviations

ADAMHA: Alcohol, Drug Abuse and Mental Health Administration
AECL: Atomic Energy of Canada Ltd.
AIDS: Acquired Immune Deficiency Syndrome
ALERT: Arctic Long-Term Environmental Research Transects program (EPA)
ALRI: Acute Lower Respiratory Infection
BMFT: Germany's Federal Ministry of Research
CCMS: Committee on Challenges of a Modern Society (NATO)
CDC: Centers for Disease Control
CEES: Committee on Earth and Environmental Sciences (FCCSET)
CEOS: Committee on Earth Observations Satellites program
CERN: European Center for Nuclear Research (Geneva)
CFC: Chlorofluorocarbon
CISET: Committee on International Science, Engineering and Technology.
CITES: Convention on International Trade in Endangered Species
CNEA: Argentina's national atomic energy commission
CNPQ: Brazil's National Research Council
CNRS: France's Centre National de la Recherche Scientifique
COARE: Coupled Ocean-Atmosphere Response Experiment
COCOM: Coordinating Committee on Multilateral Export Controls
CSPP: Computer Systems Policy Project
CSTP: Committee on Science and Technology Policy
DARPA: Defense Advanced Research Projects Agency (DOD)
DEA: Defense Exchange Agreement
DHHS: Department of Health and Human Services
DOC: Department of Commerce
DOD: Department of Defense
DOE: Department of Energy
DOI: U.S. Department of the Interior
DOS: Department of State
DOT: Department of Transportation
DRAM: Dynamic Random Access Memory
EC: Economic Community
EMR: Canada's Department of Energy, Mines and Resources
EOR: Enhanced Oil Recovery (DOE)

Glossary of Abbreviations

EPA: Environmental Protection Agency
ESA: European Space Agency
ESPRIT: European Strategic Program for Research and Development in Information Technology
ESTR: Environment, Science, and Technology Resources statistical package
EUREKA: European Research Coordinating Agency
EZ: Edmonston-Zagreb strain of measles vaccine
FCCSET: Federal Coordinating Council for Science, Engineering and Technology.
FSI: Foreign Service Institute
FWS: U.S. Fish and Wildlife Service (DOI)
FY: Fiscal Year
GATT: General Agreement on Trade and Tariffs
GLOBEC: Global Ocean Ecosystems Dynamics Research Program
GNP: Gross National Product
HIV: Human immunodeficiency virus
HUGO: Human Genome Organization
IAC: Information Analysis Center
ICSU: International Council of Scientific Unions
IEP: Information Exchange Project
IMS: Intelligent Manufacturing Systems
INPE: Brazil's National Space Institute
IOC: Intergovernmental Oceanographic Commission
IPCC: Intergovernmental Panel on Climate Change
IPR: Intellectual Property Rights
ISO: International Standards Organization
ITER: International Thermonuclear Experimental Reactor
JESSI: Joint European Submicron Silicon Initiative
JGOFS: Joint Global Ocean Flux Study (CEES)
JRRC: Japanese Reprographic Rights Center
LIGO: National Laser Interferometer Gravitational Observatory
MERP: Marine Ecosystem Response Project
MONICA: Multinational Monitoring of Trends and Determinants in Cardiovascular Disease
MRC: United Kingdom's Medical Research Council
MSAT: Mobile Telecommunications Satellite
MSC: Marie Sklodowska Curie Fund - U.S.-Poland program

Glossary of Abbreviations

MSS: Mobile Servicing System
MTA: Hungary's Academy of Science
NABE: North Atlantic Bloom Experiment (JGOFS)
NAPAP: National Acid Precipitation Assessment Program
NASA: National Aeronautics and Space Administration
NATO: North Atlantic Treaty Organization
NEI: National Eye Institute (NIH)
NEPA: China's National Environmental Protection Agency
NHLBI: National Heart, Lung and Blood Institute (NIH)
NIA: National Institute on Aging
NIAID: National Institute of Allergy and Infectious Diseases
NICHD: National Institute of Child Healthand Human Development
NIH: National Institutes of Health
NIMH: National Institute of Mental Health
NINDS: National Institute of Neurological Disorders and Stroke (NIH)
NMFS: U.S. National Marine Fisheries Service
NNSA: China's National Nuclear Safety Administration
NOAA: The National Oceanic and Atmospheric Administration
NPS: National Park Service (DOI)
NSF: National Science Foundation
NTIS: National Technical Information Service (DOC)
OECD: Organization for Economic Cooperation and Development
OES: The Bureau of Oceans and International Environmental and Scientific Affairs, the U.S. Department of State
OMFB: Hungary's National Technical Development Committee
OSTP: Office of Science and Technology Policy (OSTP)
OTKA: Hungary's National Scientific Research Fund
PASA: Participating Agency Service Agreement
PATH: Program for Appropriate Technology in Health
PHS: U.S. Public Health Service
PRC: People's Republic of China
R&D: Research and Development
RAMSAR: Convention on Wetlands of International Importance (FWS)
ROSAT: Roentgen Satellite (NASA and Germany)
S&T: Science and Technology
SAGA: Soviet-American Gas Aerosol

Glossary of Abbreviations

SEED: Support for Eastern European Democracy Act
SPRA: Special Programme for Research on Aging
SSC: Superconducting Super Collider
STOL: Short Takeoff and Landing aircraft
STRIDE: Science and Technology Reporting Information Distribution Enhancement-unclassified science officer report
TED: Turtle Excluder Device
TNC: Trade Negotiating Committee
TOGA: Tropical Ocean-Global Atmosphere (CEES)
TRIP: Trade Related Aspect of Intellectual Property Rights
TTCP: The Technical Cooperation Program
UNEP: United Nations Environment Program
USAID: U.S. Agency for International Development
USDA: U.S. Department of Agriculture
USG: U.S. Government
USGS: U.S. Geological Survey
VAMAS: Versailles Project on Advanced Materials and Standards
VAP: U.S. Vaccine Program
WCRP: World Climate Reasearch Program
WHO: World Health Organization
WMO: World Meterological Organization
WOCE: World Ocean Circulation Experiment (CEES)

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DATE: 1990
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TITLE: Mineral Perspectives Series (International)
DATE: 1991
PUBLICATION NUMBER:
PUBLICATION TYPE: Intermittent Series

AGENCY: BOM,DOI
AUTHOR: Division of International Minerals, Department of Interior
TITLE: Mineral Issues (USSR & China)
DATE: 05/90
PUBLICATION NUMBER:
PUBLICATION TYPE: Intermittent Series

AGENCY: Committee on Earth and Environment Sciences
AUTHOR:
TITLE: Our Changing Planet: The FY 1991 Research Plan
DATE: 10/90
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PUBLICATION TYPE: Annual Report

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AUTHOR: Directorate of Intelligence, Central Intelligence Agency
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AUTHOR: Department of Defense
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DATE: 06/90
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AUTHOR: Public Health Service
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DATE: 06/01/90
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PUBLICATION TYPE: Annual Report

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AUTHOR: National Institute of Allergy and Infectious Diseases, NIH
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DATE: 01/91
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DATE: 06/88
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